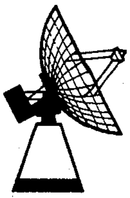
NEC

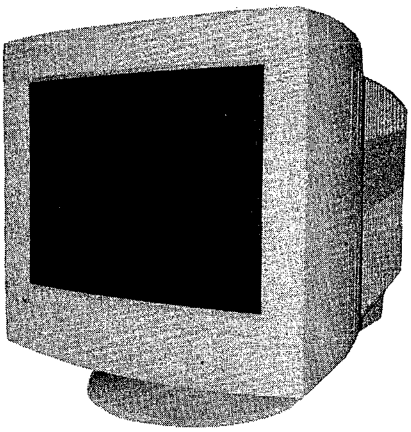
MODELS JC-2145UMA/B/R

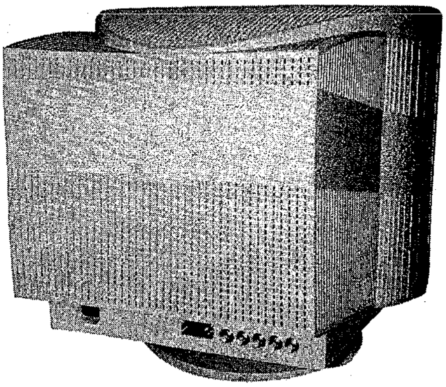
COLOR MONITOR MultiSync® P1150
SERVICE MANUAL

PART NO. 599910417



Better Service
Better Reputation
Better Profit





NEC Corporation
TOKYO, JAPAN

⚠ WARNING

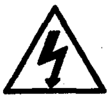
The SERVICE PERSONNEL should have the appropriate technical training, knowledge and experience necessary to :

- Be familiar with specialized test equipment, and
- Be careful to follow all safety procedures associated with high voltage CRT circuit designs to minimize danger to themselves and their coworkers.

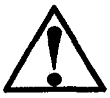
To avoid electrical chocks, this equipment should be used with an appropriate power cord and be connected only to a properly grounded AC outlet.

This equipment utilized a micro-gap power switch. Turn off the monitor by first pushing the front panel power switch. Next, remove the power cord from the AC outlet.

To prevent fire or shock hazards, do not expose this unit to rain or moisture.



This symbol warns the personnel that un-insulated voltage within the unit may have sufficient magnitude to cause electric shock.



This symbol alerts the personnel that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.

⚠ PRODUCT SAFETY CAUTION

1. When parts replacement is required for servicing, always use the manufacturer's specified replacement component.

2. Comply with all caution and safety-related notes on the product display chassis and picture tube.

3. When replacing the component, always be certain that all the components are put back in place.

4. When servicing display monitor unit, it is required that the provided lead dress is used in the high voltage circuit area.

5. It is also recommended that shatter proof goggles are worn, when removing, installing and handling the picture tube. People not equipped with the proper precautionary measures mentioned should keep the picture tube away from body while handling.

6. As for a connector, pick and extract housing with fingers properly since a disconnection and improper contacts may occur, when wires of the connector is led.

7. Use a proper screwdriver. If you use screwdriver that does not fit, you may damage the screws.

8.X-radiation precaution

This product contains critical electrical and mechanical parts essential for X-ray protection. Normal anode voltage is 27.0 kV at zero beam picture tube current under AC 100-120 V (A ver)/AC 220-240 V (B ver /R ver) input, and anode voltage must not exceed the voltages shown below under any operation condition. To measure anode voltage set brightness for very dim picture, and use a high impedance volt meter between chassis and anode lead and measure high voltage. If high voltage exceeds the specifications on the chassis schematic diagram, take the necessary corrective action.

Table MAXIMUM ANODE VOLTAGE

beam current	at 0 mA	at 0.7 mA	at 1.4 mA
A ver / B ver /R ver	34.1 kV	32.9 kV	32.5 kV

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SPECIFICATIONS

Monitor Specifications		MultiSync® P1150™ Monitor	Notes
Picture Tube	Diagonal:	21.0 inch	90° deflection, 0.28 Grille pitch, medium short persistence phosphor, aperture-grille CRT, multi-layered, anti-static screen coating, dark tint screen and OptiClear® screen surface
	Viewable Image Size:	19.6 inch	
	Radius:	1850 mm	
Input Signal	Video:	ANALOG 0.7 Vp-p/75 Ohms	
	Sync:	Separate sync. TTL Level Horizontal sync. Positive/Negative Vertical sync. Positive/Negative Composite sync. (Positive/Negative) (TTL Level) Sync on Green video (Positive) 0.7 Vp-p and sync. (Negative) 0.3 Vp-p	
Display Colors	Analog input:	Unlimited number of Colors	Depends on display card used
Synchronization Range	Horizontal:	31 kHz to 94 kHz	Automatically
	Vertical:	55 Hz to 160 Hz	Automatically
Resolutions Supported Resolution based on horizontal and vertical frequencies only		640 x 480 @ 55 to 160 Hz	Some systems may not support all modes listed
		800 x 600 @ 55 to 149 Hz	
		832 x 624 @ 55 to 141 Hz	
		1024 x 768 @ 55 to 117 Hz	
		1152 x 870 @ 55 to 103 Hz	
		1280 x 1024 @ 55 to 88 Hz	NEC cites recommended resolution at 85 Hz for optimal display performance.
		1600 x 1200 @ 55 to 75 Hz	
Active Display Area (Factory Setting)		384 x 288 mm 15.1 x 11.3 inches	Dependent upon signal timing used, and does not include border area.
Active Display Area (Full Scan)		398 x 298.5 mm 15.7 x 11.8 inches	Dependent upon signal timing used, and does not include border area.
Power Supply		AC 100 – 120 V, 50/60 Hz (A ver.) AC220-240V, 50/60Hz (B/R ver.)	
Current Rating		2.5A @ 100 – 120 V (A ver.) 1.4A @ 220-240V (B/R ver.)	
Dimensions		509 mm (W) x 519 mm (H) x 560 mm(D) 20.8 inches (W) x 20.4 inches (H) x 22.1 inches (D)	
Weight		35.0 kg 77.2 lbs	
Environmental Considerations	Operating Temperature:	10°C to +35°C	
	Humidity:	30% to 80%	
	Feet:	0 to 10,000 Feet	
	Storage Temperature:	-20°C to +60°C	
	Humidity:	10% to 90%	
	Feet:	0 to 45,000 Feet	

NOTE: Technical specifications are subject to change without notice.

MONITOR ADJUSTMENT CONTROLS

OSM™ control buttons on the front of the monitor function as follows:

	Main Menu	**Sub-Menu**
EXIT	Exits the OSM controls.	Exits to the OSM controls main menu.
CONTROL ▲/▼	Moves the highlighted area up/down to select one of the controls.	Moves the highlighted area up/down to select one of the controls.
CONTROL +/–	Moves highlighted area left/right to select one of the controls.	Moves the bar in the + or – direction to increase or decrease the adjustment.
PROCEED	Has no function.	Only executes control or enters sub, sub-menu.
RESET	Resets all the controls within the highlighted menu to the factory setting.	Resets the highlighted control to the factory setting.

NOTE: When **RESET** is pressed in the main and sub-menu, a warning window will appear allowing you to cancel the reset function.

When OSM controls are activated, icons are displayed at the top of the menu. If an arrow (→) is displayed, it indicates further choices are available.

☼ ◑ Brightness/Contrast Controls

Brightness: Adjusts the overall image and background screen brightness.

Contrast: Adjusts the image brightness in relation to the background.

Degauss: Eliminates the buildup of stray magnetic fields which alter the correct scan of the electron beams and affect the purity of the screen colors, focus and convergence. When activated, your screen image will jump and waver a bit as the screen is demagnetized.

Caution: Please allow a minimum of 20 minutes to elapse between uses of the Degauss Control.

Size and Position Controls

Left/Right: Moves the image horizontally (left or right).
Down/Up: Moves the image vertically (up or down).
Narrow/Wide: Increases or decreases the horizontal size of the image.
Short/Tall: Increases or decreases the vertical size of the image.

Color Control/AccuColor® Control System

Color presets 1 through 5 selects the desired color setting. The bar is replaced by the color setting choice from 1 to 5. Each color setting is adjusted at the factory to the stated degree Kelvin. If a setting is adjusted, the name of the setting will change from degree Kelvin to Custom.

Red, Green, Blue: NEC's AccuColor Control System increases or decreases the monitor's red, green or blue color guns depending upon which is selected. The change in color will appear on screen and the direction (increase or decrease) will be shown by the bars.

Geometry Controls

Geometry Controls Menu

The **Geometry** controls allow you to adjust the curvature or angle of the sides of your display.

Sides In/Out (pincushion): Increases or decreases the curvature of the sides either inward or outward.

Sides Left/Right (pincushion balance): Increases or decreases the curvature of the sides either to the left or right.

Sides Tilt (parallelogram): Increases or decreases the tilt of the sides either to the left or right.

Sides Align (trapezoidal): Increases or decreases the top of the screen to be the same as the bottom.

Rotate (raster rotation): Rotates the entire display clockwise or counterclockwise.

Tools 1

Language: OSM™ controls menus are available in 6 languages.

OSM Position: You can choose where you would like the OSM controls image to appear on your screen. Selecting OSM Position allows you to manually adjust the OSM controls menu left, right, up or down.

OSM Turn Off: The OSM controls menu will stay on as long as it is in use. In the OSM Turn Off sub-menu, you can select how long the monitor waits after the last touch of a button to shut off the OSM controls menu. The preset choices are 10, 20, 30, 60 120 seconds.

OSM Lock Out: This control completely locks out access to all OSM controls functions. When attempting to activate OSM controls while in the lock out mode, a screen will appear indicating that OSM controls are locked out. To activate the OSM Lock Out function, press **PROCEED**, then ▲ and hold down simultaneously.To deactivate the OSM Lock Out, press **PROCEED**, then ▲ and hold down simultaneously.

IPM™ System Off Mode: Enable: The IPM System works normally and all stages of energy savings are utilized.
Disable: The Off Mode of the IPM System is not used.

NOTE: For standard systems and graphics boards, keep the factory setting at ENABLE.

Factory Preset: Selecting Factory Preset allows you to reset all OSM control settings back to the factory settings. A warning statement will appear to confirm that you do want to reset ALL settings. Individual settings can be reset by highlighting the control to be reset and pressing the **RESET** button.

Tools 2

Moire Canceler: Moire is a wavy pattern which can sometimes appear on the screen. The pattern is repetitive and superimposed as rippled images. When running certain applications, the wavy pattern is more evident than in others. To reduce moire, adjust the On/Level by using the +/- CONTROL buttons.

Linearity: This selection allows you to adjust the spacing of the area on the screen. The purpose of this control is to ensure that a one-inch circle is a true one-inch circle wherever it is on the screen. The best way to determine the vertical linearity is as follows:

- Draw equally spaced horizontal lines using a drawing application that has a ruler.
- Use the Vertical control to adjust the spacing between the lines near the center of your screen.
- Use the Vertical Balance control to adjust the lines near the top and bottom of your screen.

Convergence: Aligns all three colors (R,G,B) to form a single color (white). The purpose of this control is to ensure that a white line drawn on the screen is as crisp and clear as possible.

- Use the Horizontal control to adjust the alignment of the white lines in the up/down direction.
- Use the Vertical control to adjust the alignment of the white lines in the left/right direction.

GlobalSync® Control: Eliminates picture impurities that may result from the earth's magnetic field. Move the location of the control bar to the closest compass point that corresponds with the direction in which the CRT faces. Adjust the control until the most even level of blue is reached.

Information

Provides you with additional information which includes the following:

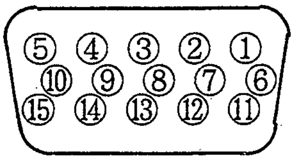
Fitness Tips: The Fitness Tips provide you with helpful reminders to periodically rest your eyes. You may select how frequently the reminders are displayed based upon your individual needs. Select an interval from 15, 30, 45, 60, 90, 120 minutes for the tips to appear. When the tips appear, follow the advice of the tips and press **EXIT** to clear.

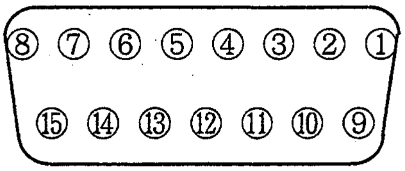
Display Mode: Indicates the current mode and frequency setting of the monitor.

Pin Assignment Table

1. VIDEO INPUT

1.1. D-SUB INPUT

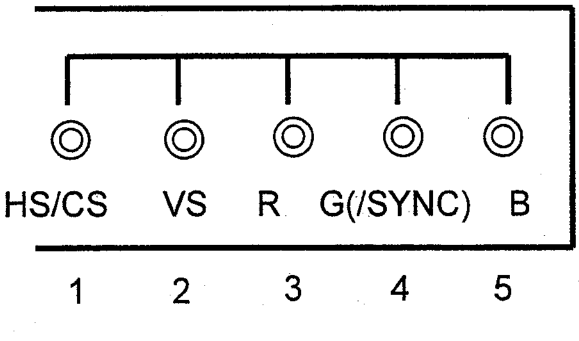




	MINI D-SUB 15 P (FEMALE)			D-SUB 15P (FEMALE)		
PIN NO.	SEPARATE SYNC	COMPOSITE SYNC	SYNC ON GREEN	SEPARATE SYNC	COMPOSITE SYNC	SYNC ON GREEN
1	RED			GROUND		
2	GREEN	GREEN W/SYNC		RED		
3	BLUE			H SYNC	H/V SYNC	-
4	GROUND			Sense0		
5	GROUND			GREEN	GREEN W/SYNC	
6	GROUND			GROUND		
7	GROUND			SDA/Sense1		
8	GROUND			-		
9	-			BLUE		
10	GROUND			Sense2		
11	GROUND			GROUND		
12	-			V SYNC		
13	H SYNC	H/V SYNC	-	GROUND		
14	V SYNC			GROUND		
15	-			SCL		

NOTE : When a monitor receive a signal of SYNC ON GREEN, it can not return from PMS. OFF mode. Turn on the power switch again.

1.2. BNC INPUT



BNC Number	
1	Horizontal Sync / Composite Sync
2	Vertical Sync
3	Red
4	Green / Green with Sync
5	Blue

2. MULTICABLE'S PIN ASSIGNMENT

SIGNALS	MINI D-SUB 15P (MALE)	D-SUB 15P (MALE)
RED	1	2
GREEN/SYNC.ON GREEN	2	5
BLUE	3	9
H SYNC/H/V/SYNC	13	3
V SYNC/V-MODE	14	12
Sense 0	-	4
Sense 2	-	10
SDA/Sense 1	12	7
SCL	15	15
GROUND	4 5 6 7 8 10 11	1 6 11 13 14
NO CONNECTION	9	8

SERIAL NUMBER INFORMATION

Refer to the serial number information shown below.

SERIAL NUMBER LABEL

NEC Model No.
Manufactured JC-2145UMA
September 1996 Serial No.

6 9 0 0 0 0 1 C E

Manufactured Year :
(Last digit)

Manufactured Month :

January to September	1 to 9
October	X
November	Y
December	Z

00001 ~ on ward
(Start from 00001 ~ when month is changed.)

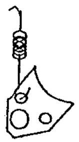
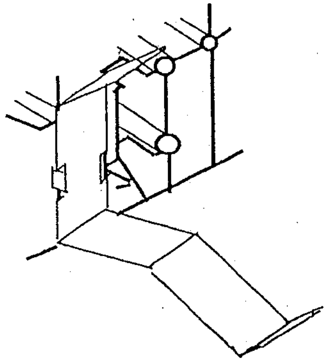
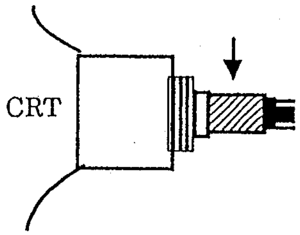
Factory mark :

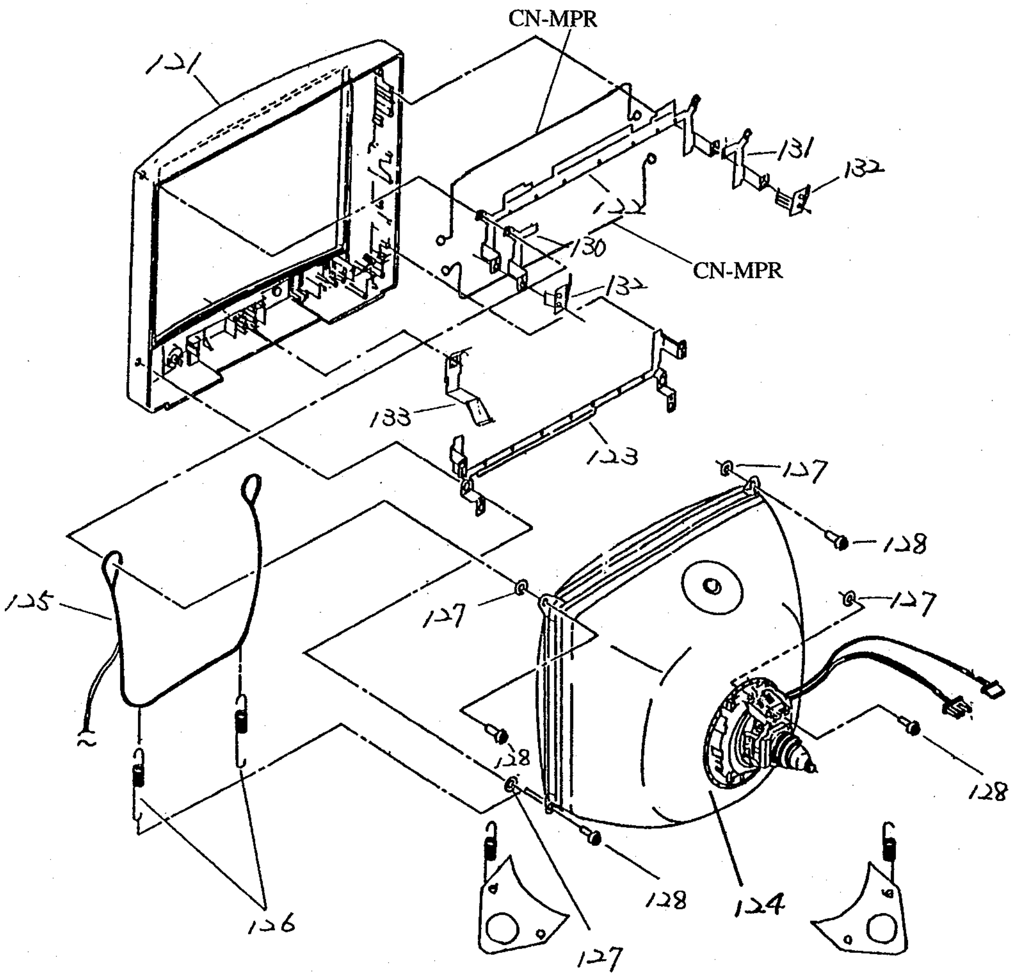
NEC NAGANO	"C"
NAGANO KOGYOU	"D"
NIITAKA	"H"

Model mark
MITSUBISHI CRT Model ··· E

Note : Models JC-2145UMB and JC-2145UMR comply with the above.

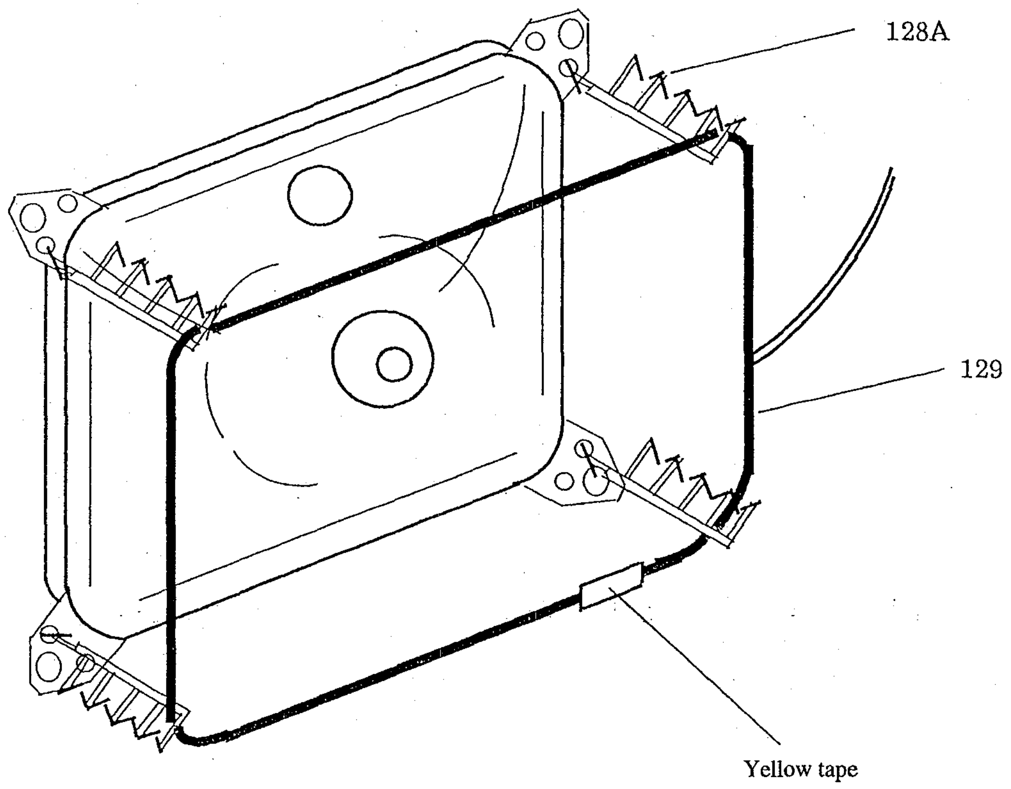
ASSEMBLY

REMARK	SYMBOL
COIL SPRING insert to hole outside lug of CRT. 	126
Attach the adhesive piece in a place of under figure. 	133
Attached Glass cloth tape (92203037) to neck of CRT as follow. (1 turn)  	

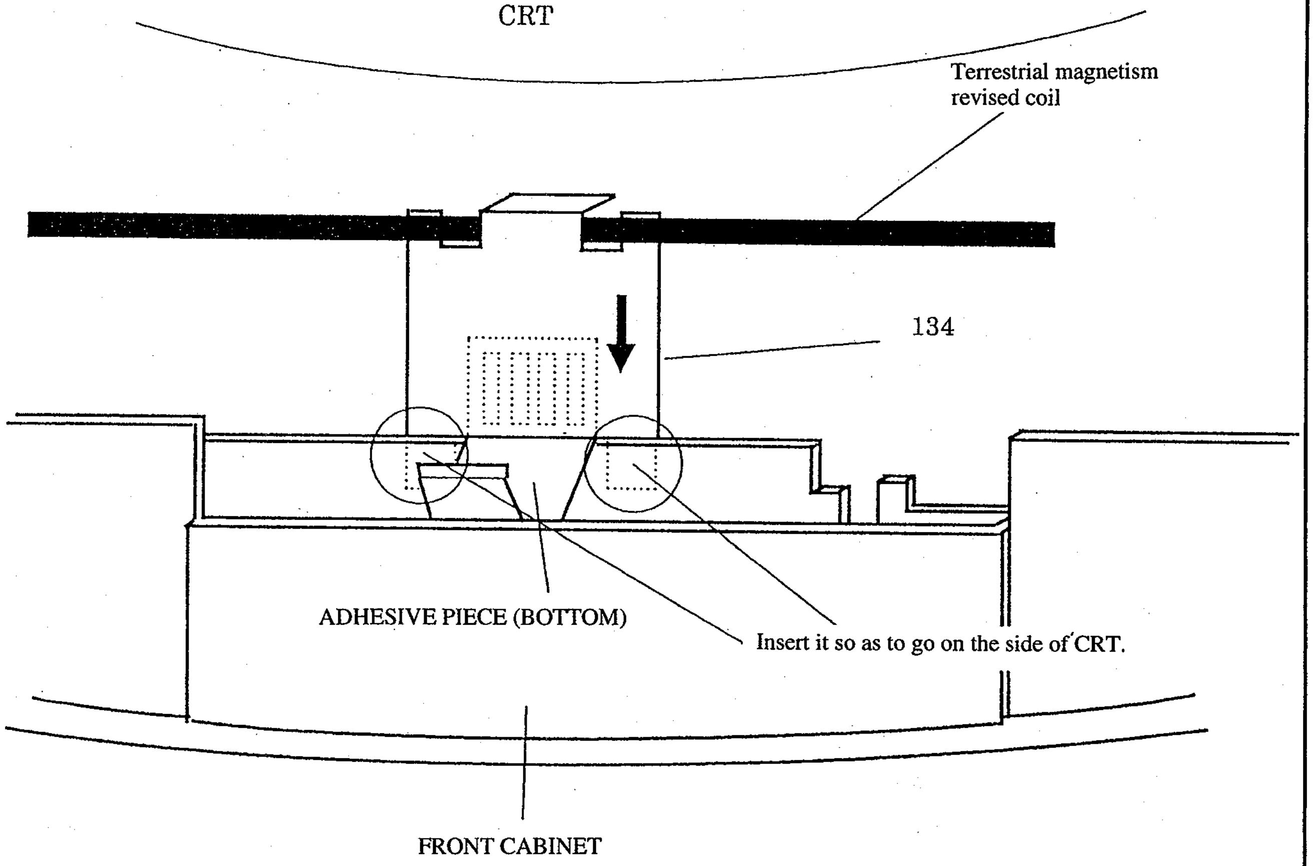


121
CN-MPR
131
132
122
130
132
CN-MPR
133
123
127
128
127
125
127
128
126
127
128
124
128

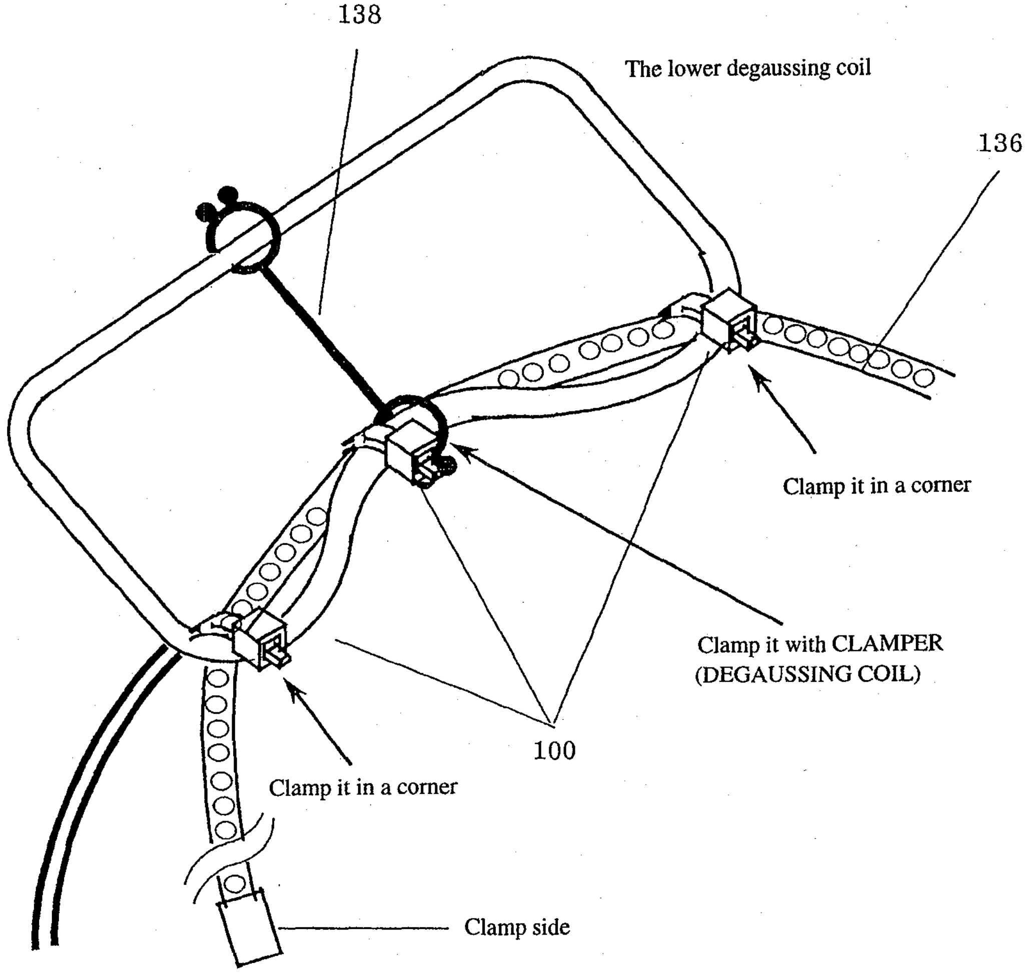
REMARK	SYMBOL
Cord clamper insert to hole 4 places of lug of CRT.	128A
A terrestrial magnetism revised coil insert the most outside of clamper. (Attach it in order that yellow tape becomes down.)	129

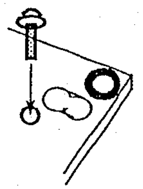
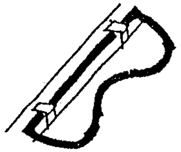


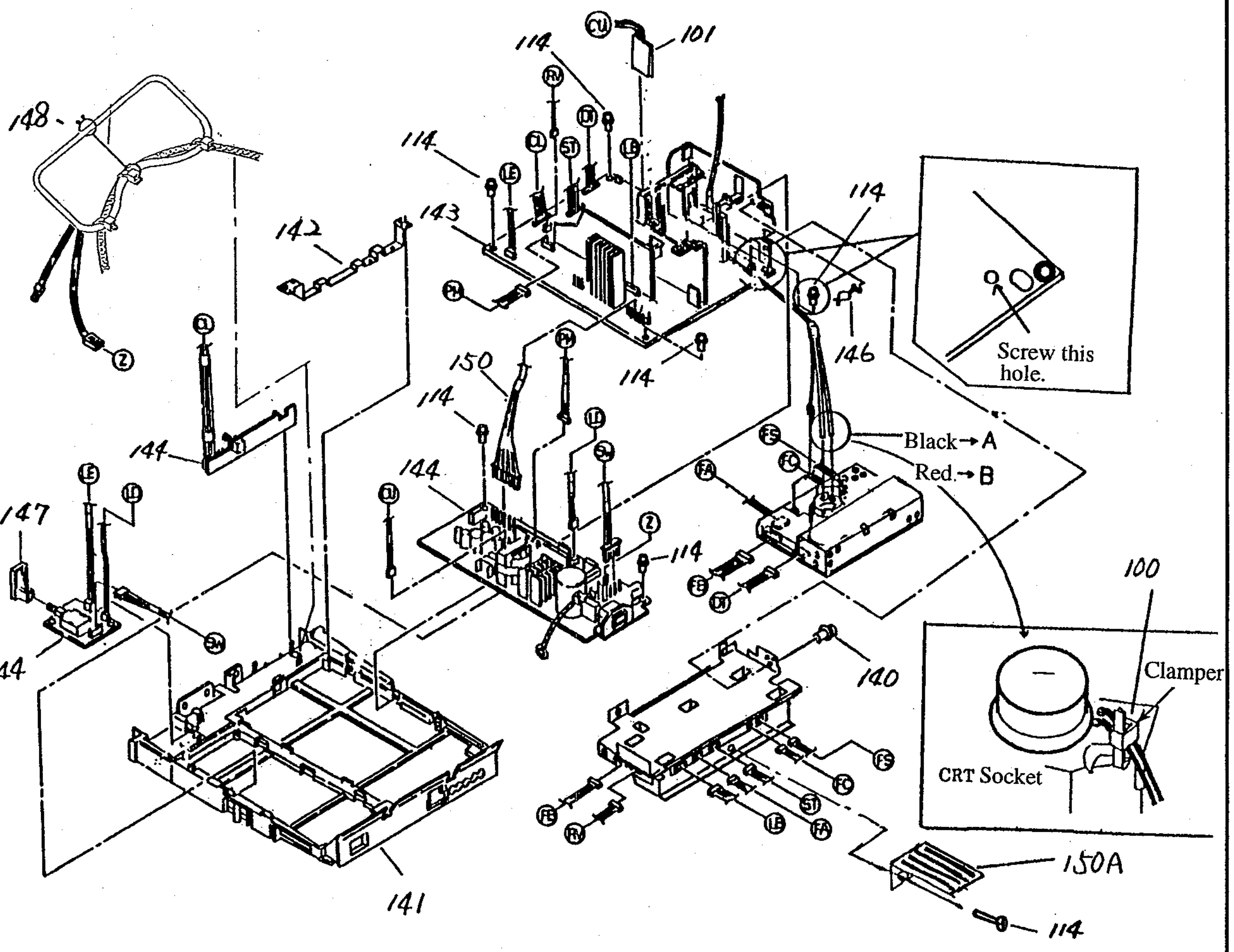
REMARK	SYMBOL
Attach the barrier (adhesive piece) to a terrestrial magnetism revised coil. SAFETY	134

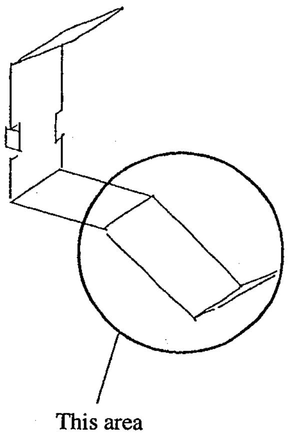

CRT
Terrestrial magnetism revised coil
134
ADHESIVE PIECE (BOTTOM)
Insert it so as to go on the side of CRT.
FRONT CABINET

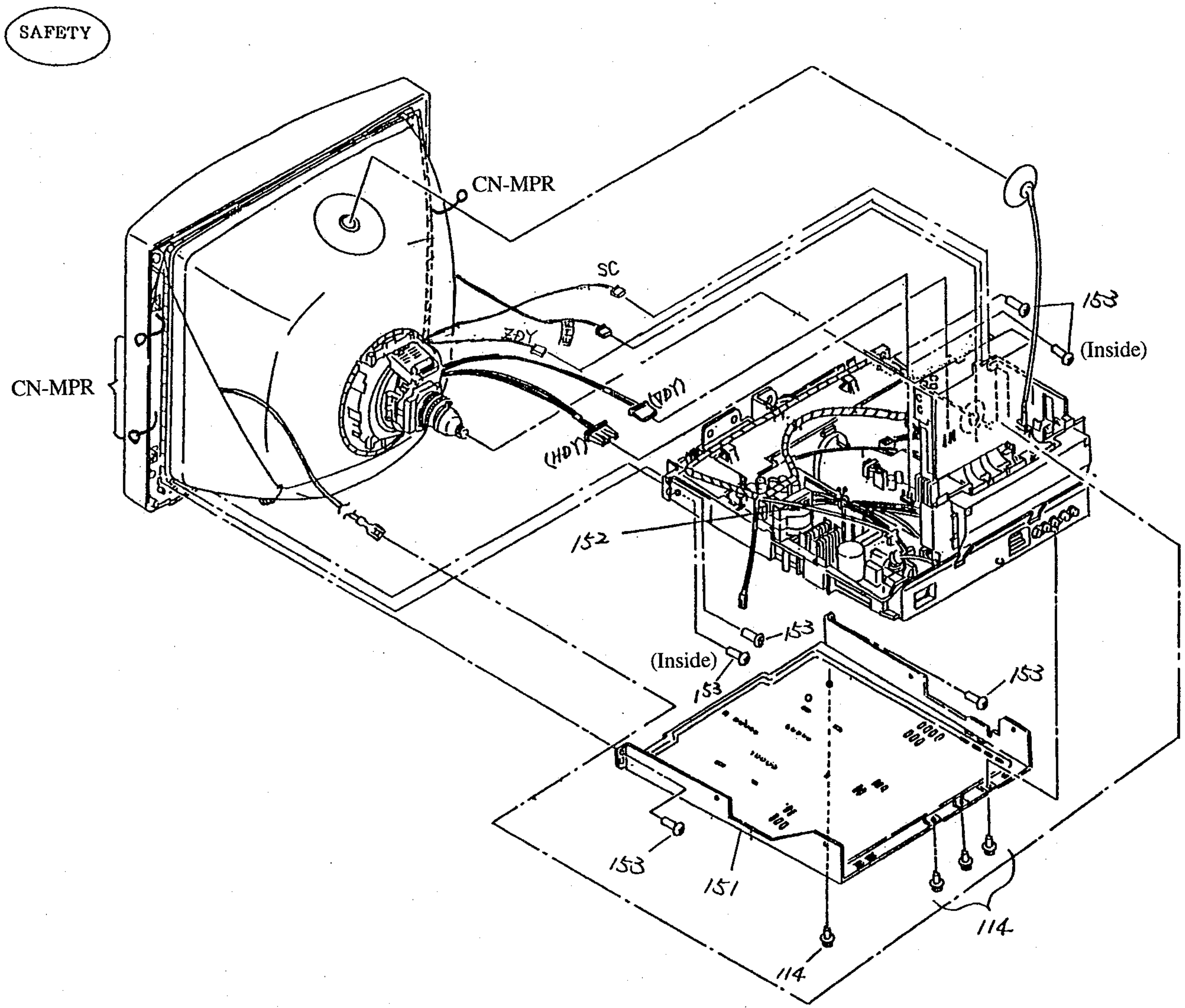
REMARK	SYMBOL
Clamp the CLAMPER (DEGAUSSING COIL) on the lower side of degaussing coil. Set the CLAMPER (DEGAUSSING COIL) to the center.	100 136


138
The lower degaussing coil
136
Clamp it in a corner
Clamp it with CLAMPER (DEGAUSSING COIL)
100
Clamp it in a corner
Clamp side

REMARK	SYMBOL	
Screw the DEF PWB at the place of following figure. (near FBT) 		
Insert the PWE-469F to CN-CS on the DEF PWB.	101	
Insert the lead clamper to the horizontal heat sink, and clamp the focus lead.	146	SAFETY
Hang the front side of degaussing coil on the degaussing holder. 	148	
Insert the Focus lead to the CRT socket. Black → Insert to A Red → Insert to B		SAFETY
Clamp the Focus lead.	151	
Attach the ADHESIVE PIECE (VIDEO) to PWB frame after attachment the BRACKET (VIDEO).	150A	
Insert a connector of every kind.		

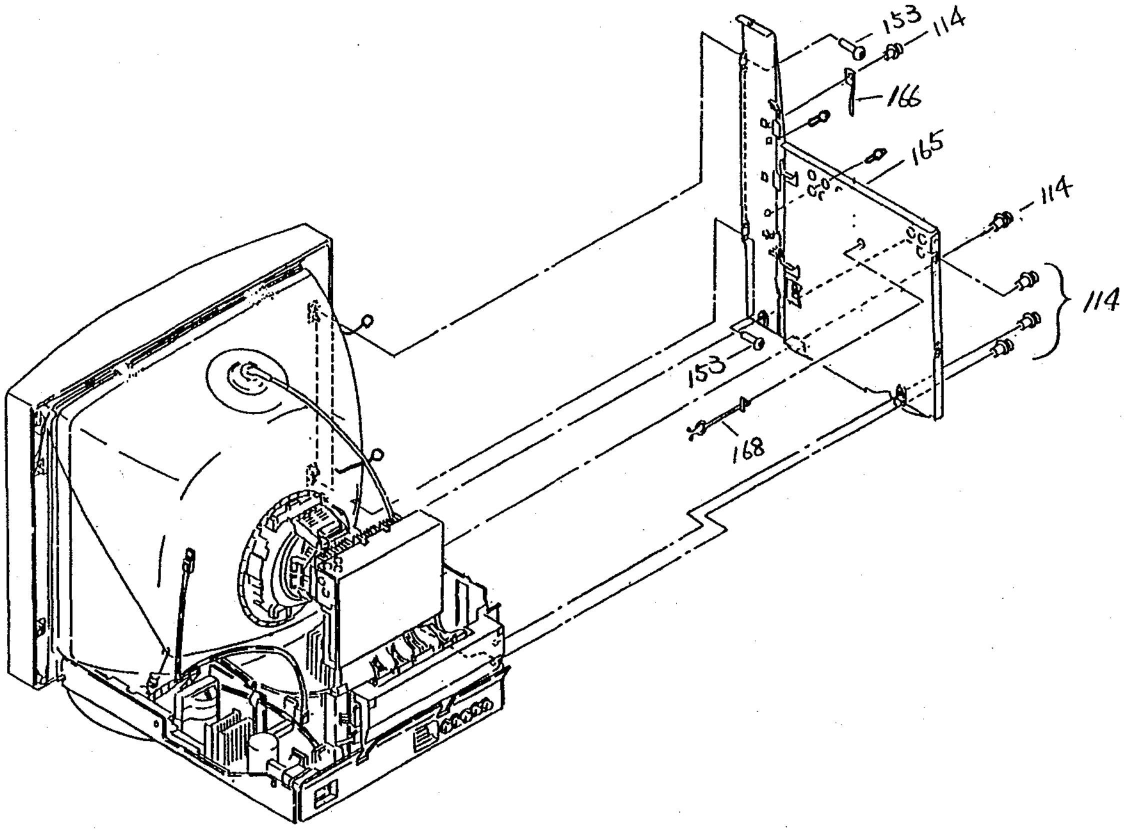

101
114
148
142
143
114
114
146
Screw this hole.
150
114
144
144
147
Black→A
Red→B
114
100
Clamper
144
140
CRT Socket
141
150A
114

REMARK	SYMBOL
Insert the lead clamper to the SW MAIN PWB, and clamp the CN-SW, CN-K.	152
Insert the connector from CRT. CN-VDY, HDY, SC, ZDY, EMF	
Be careful that adhesive piece does not appear outside when chassisbase is attached. (Put it on the inside) 	151



SAFETY
CN-MPR
CN-MPR
SC
ZDY
(VDY)
(HDY)
153
(Inside)
152
153
(Inside)
153
153
153
151
114
114

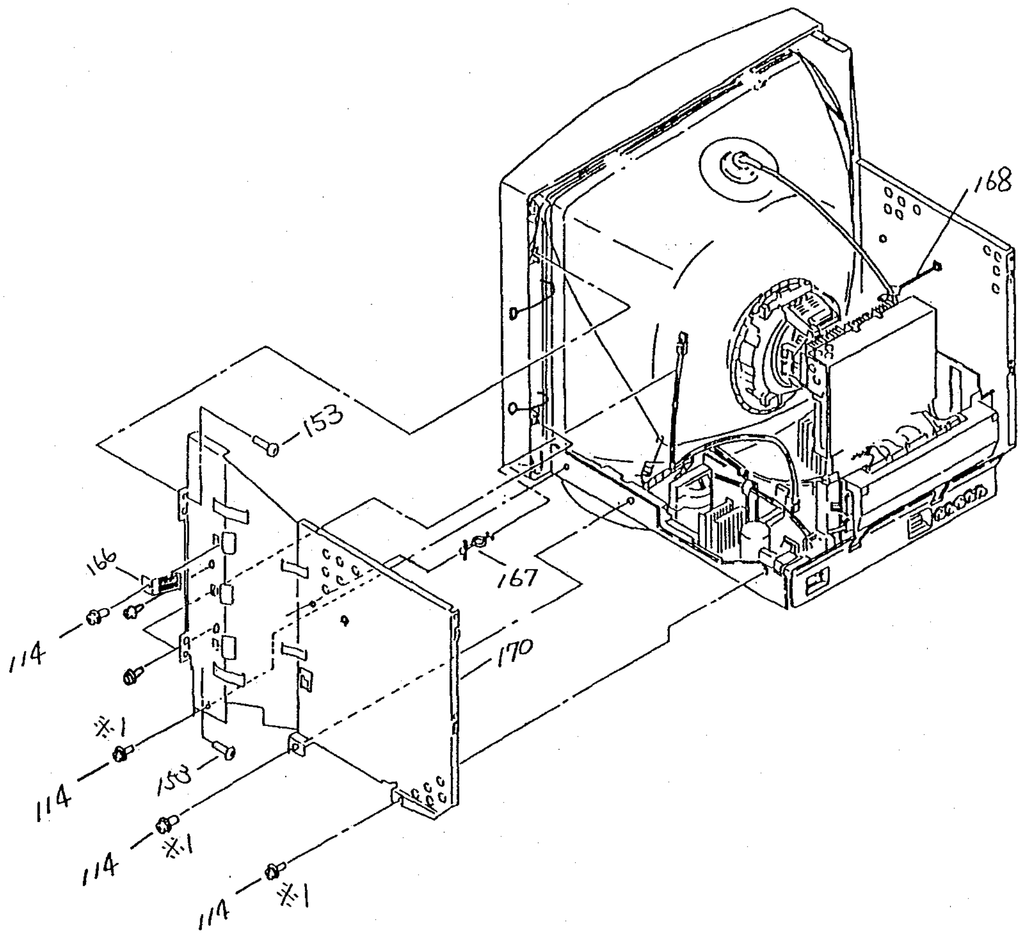
REMARK	SYMBOL


153
114
166
165
114
114
153
168

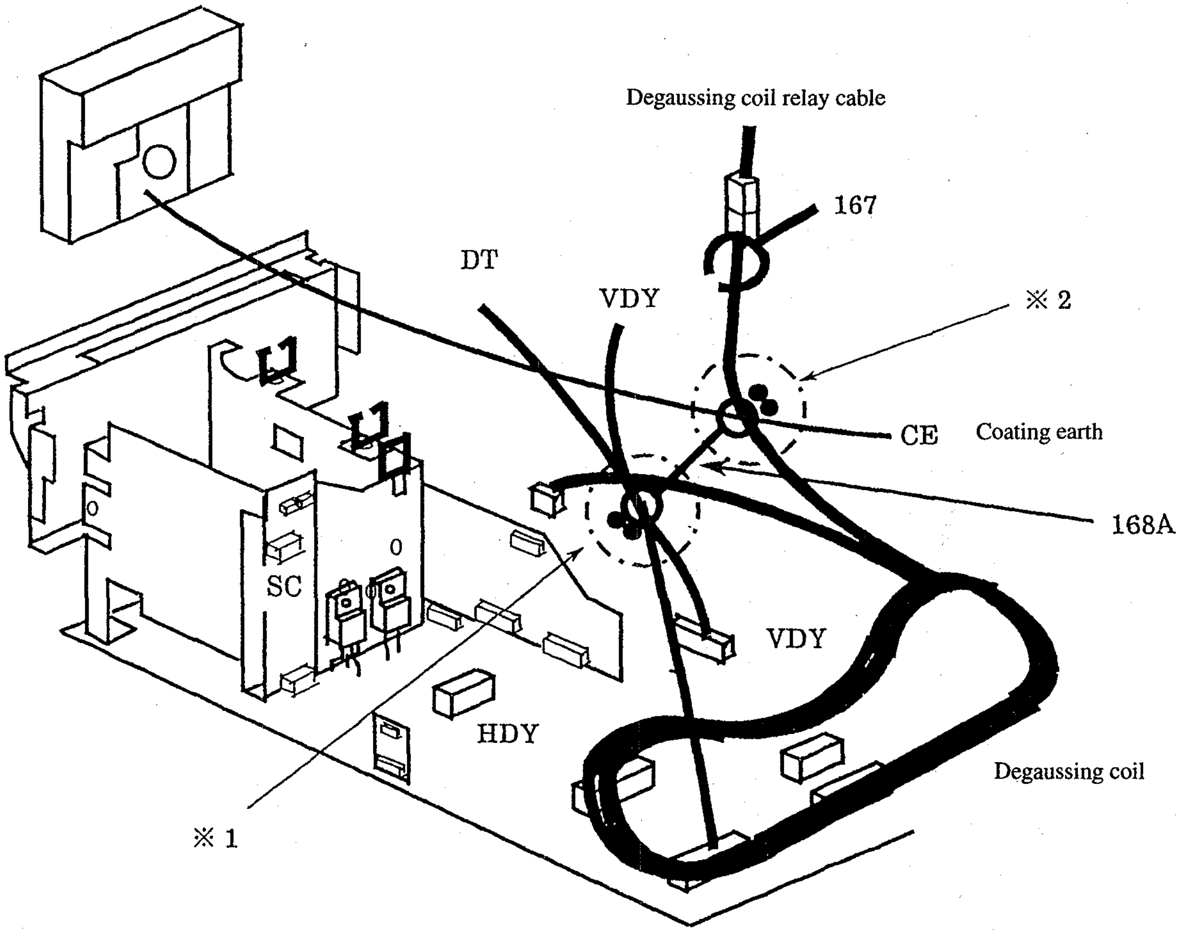
REMARK	SYMBOL
Clamp the Anode lead.	168
It is bad that there are looseness or float of a screw of side chassis ※ 1. For attach the safety earth certainly.	※ 1

SAFETY

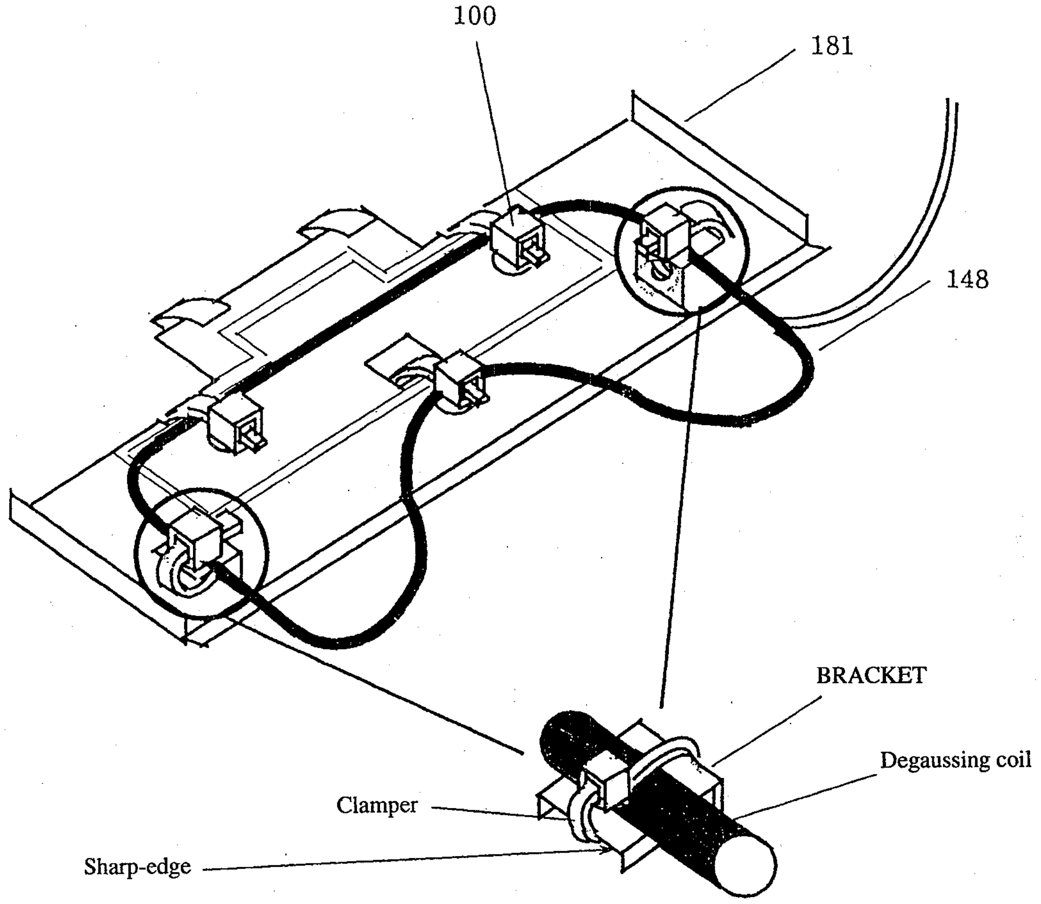
SAFETY


168
153
166
167
170
114
※1
114
153
114
※1
114
※1

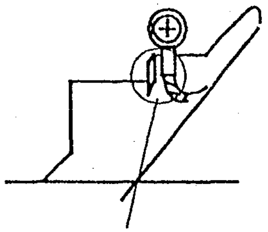
REMARK	SYMBOL
Clamp the degaussing coil relay cable with the clamper.	167
Clamp the CN-VDY and CN-DT.	168A
Clamp the CN-CE and degaussing coil relay cable.	※ 1 ※ 2

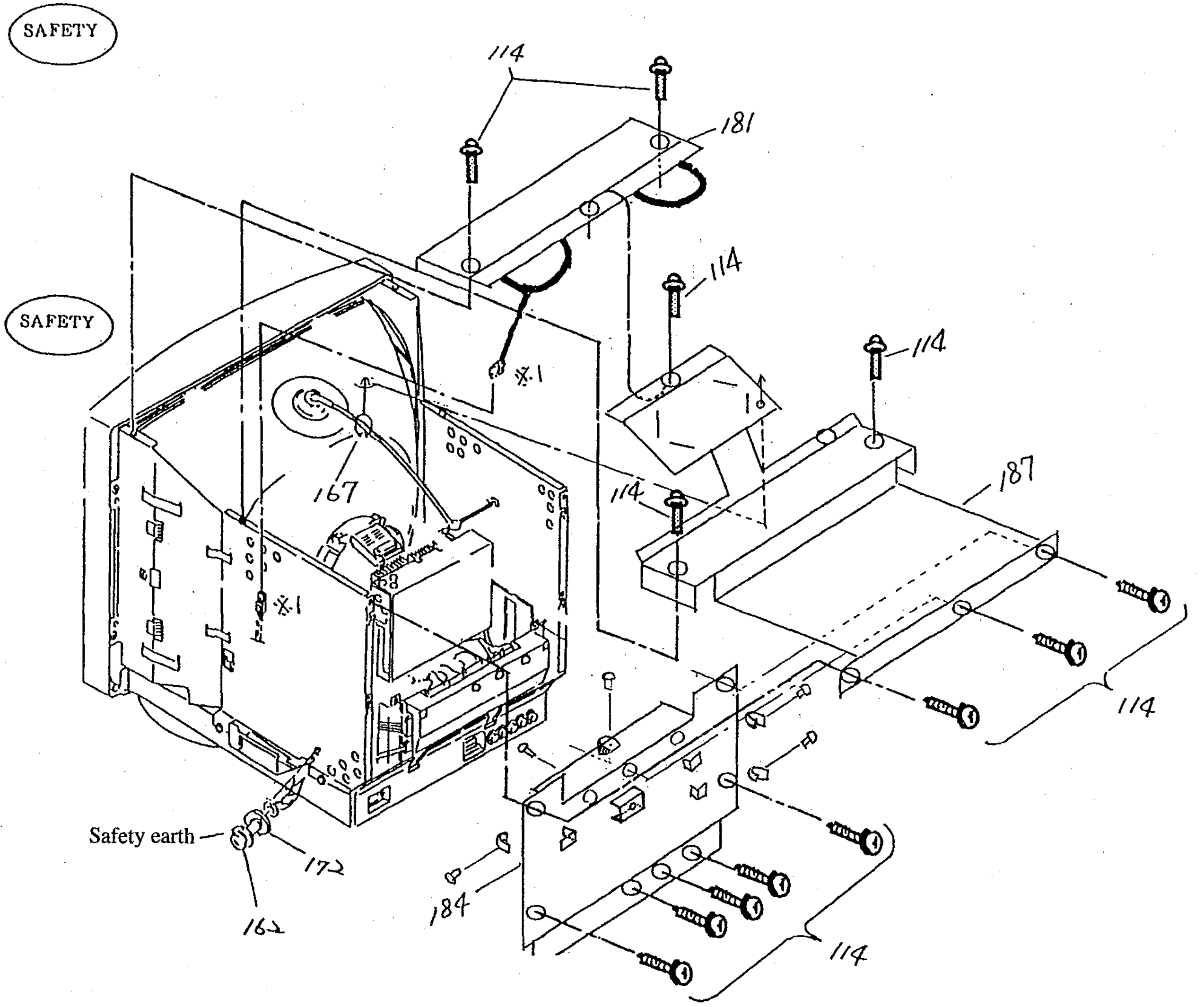

Degaussing coil relay cable
167
DT
VDY
※ 2
CE
Coating earth
168A
SC
0
VDY
HDY
Degaussing coil
※ 1

REMARK	SYMBOL
Clamp the degaussing coil to the SHIELD PLATE (TOP) with clamper.	148 181 100


100
181
148
BRACKET
Degaussing coil
Clamper
Sharp-edge

SAFETY Clamp the degaussing coil on the BRACKET.
Be careful that the degaussing coil does not touch the sharp edge of BRACKET.

REMARK	SYMBOL
Insert the lead clamper (H29.5) to the SHIELD PLATE (TOP, B) ASSY and clamp the Anode lead.	167
Screw the safety earth terminal so as following figure.  Screw the lead while it is pushed on project of bracket.	162
Insert the degaussing coil relay cable till sound. Confirm that can not pull out after insert it.	※ 1
Confirm that the lower side of degaussing coil do not appear outside of side chassis.	
Dress wire CN-FB. ↑ Perform it before attached SHIELD PLATE (TOP, B).	


SAFETY
SAFETY
114
181
114
114
※1
167
114
187
※1
114
Safety earth
172
162
184
114

ADJUSTMENT PROCEDURES

Application

These specifications outline the adjustment procedures for Models JC-2145UMA/B/R 21 inch color monitor.

Model Name:	JC-2145UMA/B/R
Destination:	North America, Europe, Asia, and the Southern Hemisphere Standard Adjustment Conditions

Standard Adjustment Conditions

1. Power Supply Voltage

JC-2145UMA:	AC 120 V±5%	60Hz
JC-2145UMB/R:	AC 220 V±5%	50Hz

2. Warm Up

Adjust this monitor after a minimum of sixty minutes to allow unit to reach ambient operating temperature. Factory-mode is defined in items below.

※ Do not extend a picture beyond fullscan concerning backraster and an displayed picture at the time of a warm-up. Reduce a picture size with VR401 when vertical size is overscan. Switch by SW582 and adjust VR582 when horizontal position of displayed picture is off to one side.

3. Signals

Video : Analog 0.7±0.01 Vp-p Positive (terminated at 75 ohms ±1%)
or
Analog sync on green
Video 0.7±0.01 Vp-p positive
Sync 0.3±0.01 Vp-p negative (terminated at 75 ohms ±1%)

Sync : TTL level
H/V separate, positive / negative
or
H/V composite, positive / negative
or
sync on green, 0.3±0.01 Vp-p negative (terminated at 75 ohms ±1%)

4. Magnetic Fields

	Vertical Magnetic Fields	Horizontal Magnetic Fields
A, B Version	35±1 μT	30±1 μT
R Version	-40±1 μT	30±1 μT

* Unless instructed otherwise, the CRT face should be facing to the east.

* Degauss the entire unit with an external degaussing coil for the adjustment.

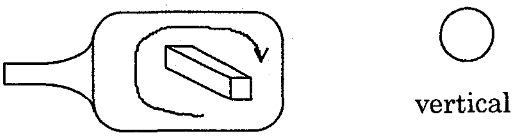
※Notes about degaussing method

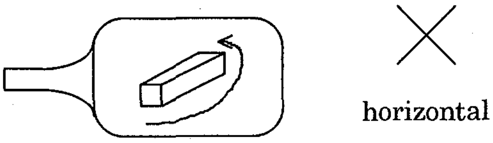
Follow the degaussing procedure below.

1) Use cylinder-shaped degaussing coil. Do not use ring degaussing coil.

2) In order to remove a magnetization from top sides, base shield and chassis, degauss each side. Do not switch off the degaussing coil abruptly. Move the degaussing coil slowly when degaussing.

3) To degauss panel surface. Move the degaussing coil vertically near the panel surface. Keep distance of panel surface and degaussing coil to more than 15 mm.



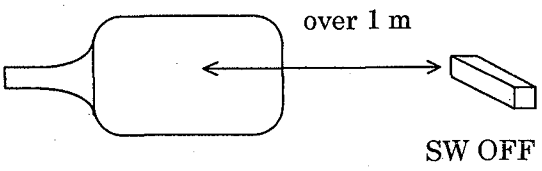


4) Degaussing method of CRT surface

Starting from edge of CRT, move the degaussing coil toward CRT center in circular motion, spending 6 to 7 seconds.

5) After sufficiently degaussing the CRT, move degaussing coil slowly away from the panel surface while rotating from corner to center, taking more than 3 seconds.

Turn off SW more than 1 m away from the CRT. Degauss again if the unit is gaussed.



5. Signal Generator

LVG-1603 is recommended for signal generator.

Use calibrated signal generators. However, use VG-819 in focus regulation.

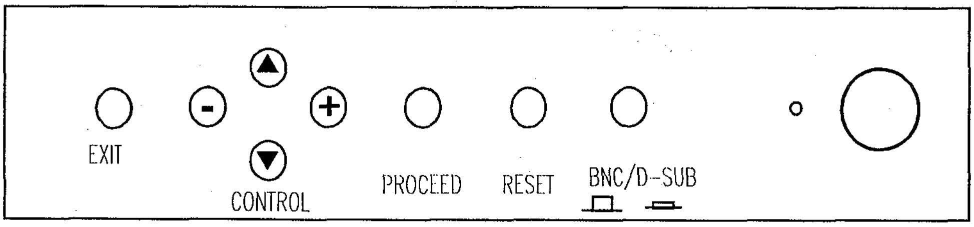
Note) Adjustment timings are timing tables and are not programmed timing.

6. Color Analyzer

The color analyzer should be CA-100 (made by MINOLTA) or compatible.

7. OSM Menu Operation

7-1. Front Panel



7-2. OSM Menu

This unit is adjusted in on screen menu by front panel key operation.

There are 2 types of On Screen menu.

(1)	Menu (user):	This Menu can be operated by a customer.
(2)	Menu (service):	This Menu is hidden from a customer.

Hereafter, they will be called MENU(U) and MENU(S).

The menu can be displayed when the signal is input to the display unit.

7-3. Factory Mode

This unit has the MPU function called "Factory Mode".

In factory mode, there are two ON/OFF conditions.

ON: LED color is usually yellow.
Power Management function is non-operational.

OFF: LED color changes by an input condition of the sync signal.
When both horizontal and vertical sync signals are input, LED color is green.

When the signal cable is disconnected from the signal generator, Power Management function operates.
It is not possible to enter MENU(S) by shortcut key.

Set the factory mode to ON condition at adjustment time.
Set the factory mode to OFF after completing adjustment.

7-4. Factory Mode Setting

7-4-1. Factory Mode OFF → ON

(1) Open Menu(U),TAB7) "DISPLAY MODE".
(2) Push and hold "RESET" SW and push "▲", "▼" SW at the same time.
(3) A "WARNING" message will be displayed. Push "PROCEED" SW once.
(4) LED indicator light turn to Yellow from Green.

7-4-2. Factory Mode ON → OFF

(1) When OSM MENU is displayed, push "EXIT" SW twice.
Otherwise, push "EXIT" SW once.

(2) A "WARNING" message will be displayed and push "EXIT" SW once.

(3) LED returns to Green.

7-5. Displaying the OSM (Open Menu)

7-5-1. Factory Mode OFF

Main Menu(U):	Push switch "EXIT", "+", "-", "▲", or "▼" once.
Main Menu(S):	Open Menu(U) ,TAB7) "DISPLAY MODE". Push and hold "RESET" SW and push "▲", "▼" SW at the same time. A "WARNING" message will be displayed and push "PROCEED" SW once.

7-5-2. Factory Mode ON

Main Menu(U):	Push switch "+", "-", "▲", or "▼" once.
Main Menu(S):	Push "PROCEED" SW once.

7-5-3. Self Test

Set it by ON/OFF of RESET button at Factory mode ON condition.
Self test mode does not operate when OSM is displayed.

7-6. OSM Turn Off

* To Close the Menu

Push "EXIT" SW while Menu (U) or Menu (S) is displayed

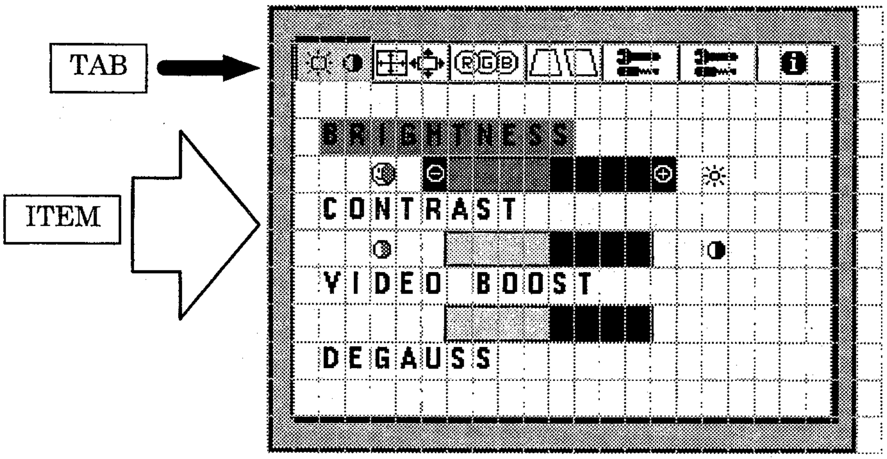
While	TAB is highlighted	: One time.
	ITEM is highlighted	: Two times.
	entering SUB MENU	: Three times.

* To close MENU temporarily.

Push "PROCEED" SW once, while Menu (S) is being displayed.
Push "PROCEED" SW once more, Menu (S) is displayed again.

7-7. TAB, Item, Sub Menu Change

TAB to TAB	: Push "-" SW or "+" SW.
TAB to item	: Push "▲" SW or "▼" SW
Item to sub Menu	: Push "PROCEED" SW once.
Item to item	: Push "▲" SW or "▼" SW.
Sub Menu to item	: Push "EXIT" SW once.
Item to TAB	: When top item is selected, push "▲" SW. When bottom item is selected, push "▼" SW. Push "EXIT" all items.


TAB
ITEM
BRIGHTNESS
CONTRAST
VIDEO BOOST
DEGAUSS

7-8. To change Data Value

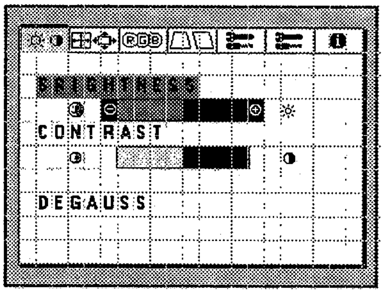
Data values are changed by pushing "-" or "+" SW.

7-9. To save Data Value

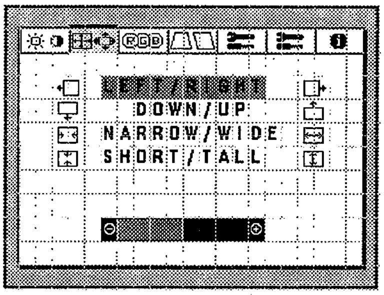
Data values are saved on EEPROM, when highlighted ITEM is changed.

7-10. Structure of OSM Menu (user)

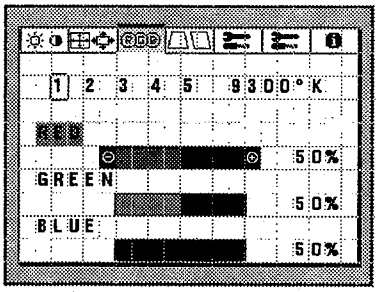
TAB 1) BRIGHTNESS & CONTRAST


BRIGHTNESS
CONTRAST
DEGAUSS

TAB 2) SIZE & POSITION


LEFT/RIGHT
DOWN/UP
NARROW/WIDE
SHORT/TALL

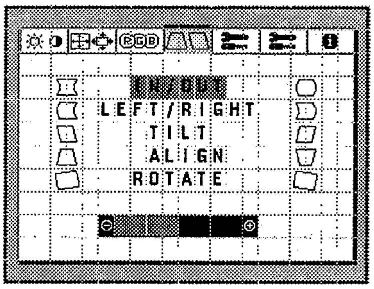
TAB 3) COLOR CONTROL


1 2 3 4 5 9300°K
RED
50%
GREEN
50%
BLUE
50%

PRESET

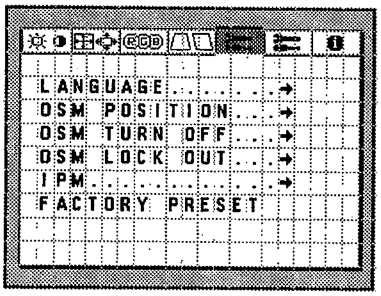
No.1 (9300° K) No.2 (7500° K)
No.3 (6500° K) No.4 (5000° K)
No.5 (4200° K)

TAB 4) GEOMETRY

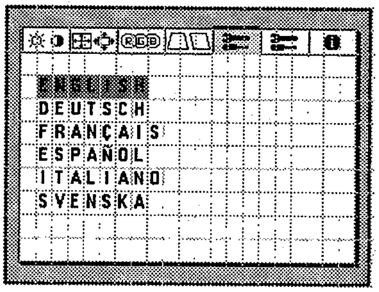

IN/OUT
LEFT/RIGHT
TILT
ALIGN
ROTATE

Structure of OSM Menu (user) (continued)

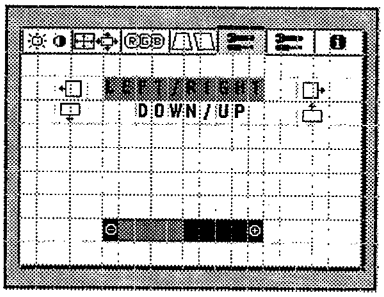
TAB 5) TOOL 1


LANGUAGE.........→
OSM POSITION....→
OSM TURN OFF....→
OSM LOCK OUT....→
IPM.............→
FACTORY PRESET

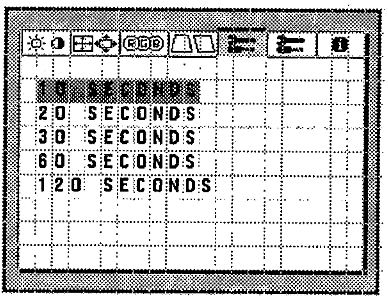
ITEM 5-1) LANGUAGE


ENGLISH
DEUTSCH
FRANÇAIS
ESPAÑOL
ITALIANO
SVENSKA

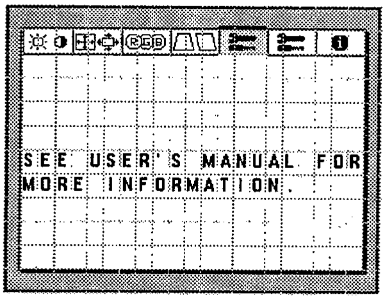
ITEM 5-2) OSM POSITION


LEFT/RIGHT
DOWN/UP

ITEM 5-3) OSM TURN OFF

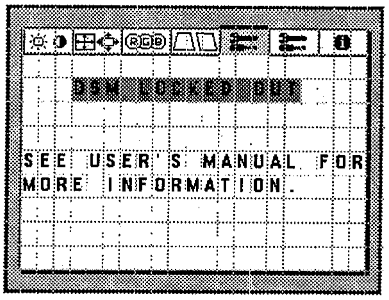

10 SECONDS
20 SECONDS
30 SECONDS
60 SECONDS
120 SECONDS

ITEM 5-4) OSM LOCK OUT



SEE USER'S MANUAL FOR MORE INFORMATION.

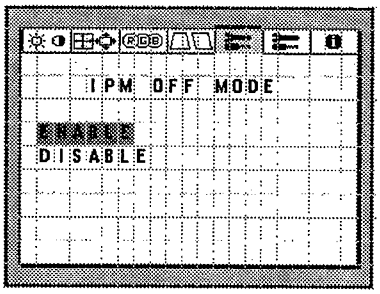
ITEM 5-4) OSM LOCK OUT



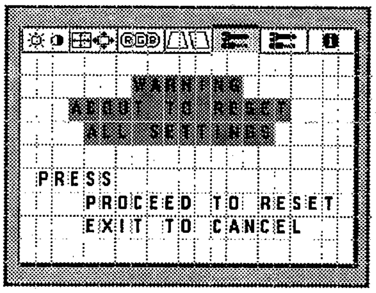
OSM LOCKED OUT

SEE USER'S MANUAL FOR MORE INFORMATION.

ITEM 5-5) IPM OFF MODE CONTROL FUNCTION


IPM OFF MODE
ENABLE
DISABLE

ITEM 5-6) FACTORY PRESET

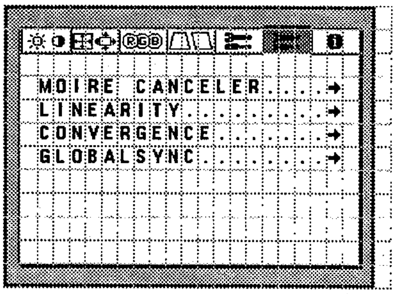


WARNING
ABOUT TO RESET
ALL SETTINGS

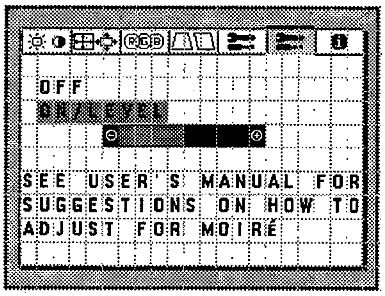
PRESS
PROCEED TO RESET
EXIT TO CANCEL

Structure of OSM Menu (user) (continued)

TAB 6) TOOL2

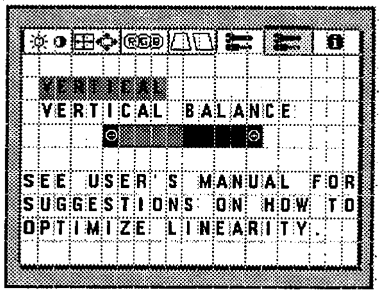

MOIRE CANCELER.....→
LINEARITY.........→
CONVERGENCE.......→
GLOBALSYNC........→

ITEM 6-1) MOIRE CANCELLER


OFF
ON/LEVEL

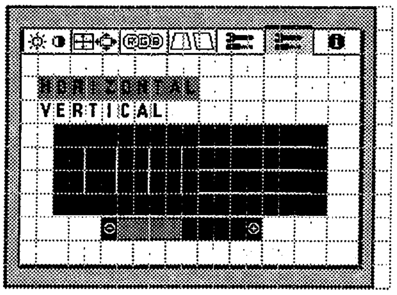
SEE USER'S MANUAL FOR SUGGESTIONS ON HOW TO ADJUST FOR MOIRÉ

ITEM 6-2) LINEARITY

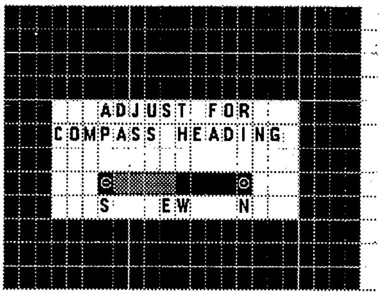

VERTICAL
VERTICAL BALANCE

SEE USER'S MANUAL FOR SUGGESTIONS ON HOW TO OPTIMIZE LINEARITY.

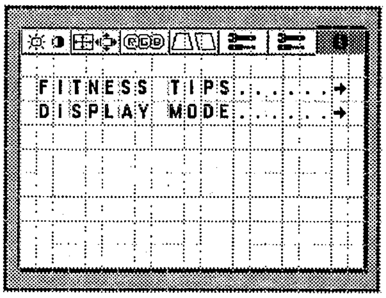
ITEM 6-3) CONVERGENCE


HORIZONTAL
VERTICAL

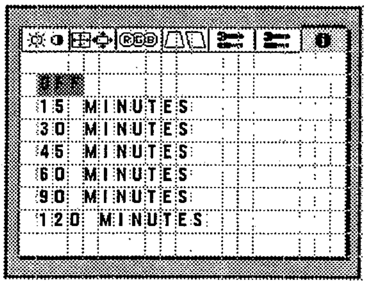
ITEM 6-4) GLOBALSYNC


ADJUST FOR COMPASS HEADING

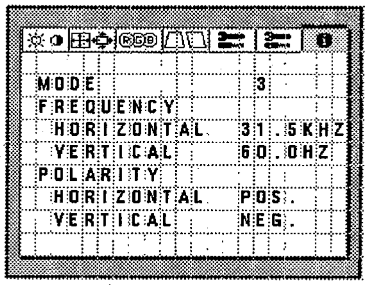
TAB 7) INFORMATION


FITNESS TIPS.......→
DISPLAY MODE.......→

ITEM 7-1) FITNESS TIPS

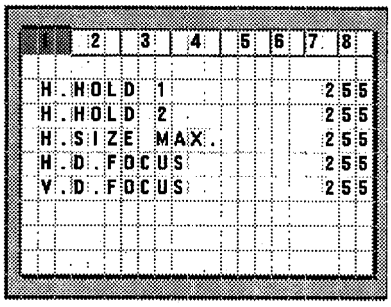

OFF
15 MINUTES
30 MINUTES
45 MINUTES
60 MINUTES
90 MINUTES
120 MINUTES

ITEM 7-2) DISPLAY MODE


MODE 3
FREQUENCY
HORIZONTAL 31.5KHZ
VERTICAL 60.0HZ
POLARITY
HORIZONTAL POS.
VERTICAL NEG.

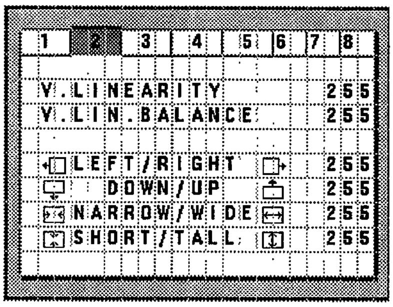
Structure of OSM Menu (service)

[TAB 1 (S)]



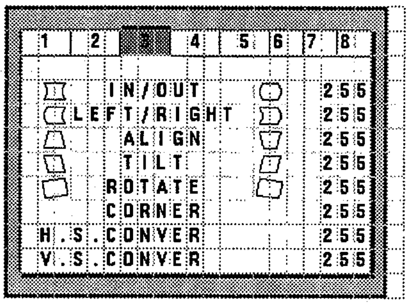
```
H.HOLD 1          255
H.HOLD 2          255
H.SIZE MAX.       255
H.D.FOCUS         255
V.D.FOCUS         255
```

[TAB 2 (S)]



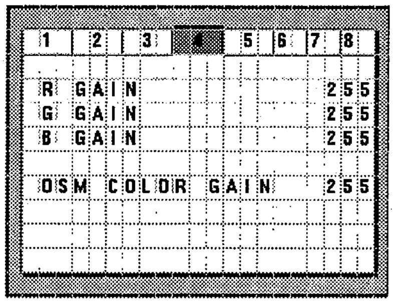
```
V.LINEARITY         255
V.LIN.BALANCE       255

 LEFT/RIGHT         255
   DOWN/UP          255
 NARROW/WIDE        255
 SHORT/TALL         255
```

[TAB 3 (S)]



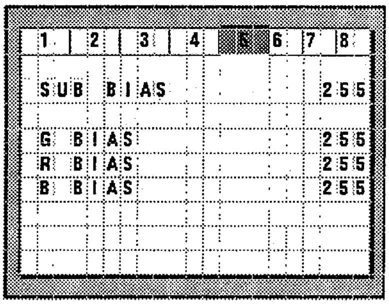
```
     IN/OUT         255
 LEFT/RIGHT         255
     ALIGN          255
     TILT           255
     ROTATE         255
     CORNER         255
H.S.CONVER          255
V.S.CONVER          255
```

[TAB 4 (S)]



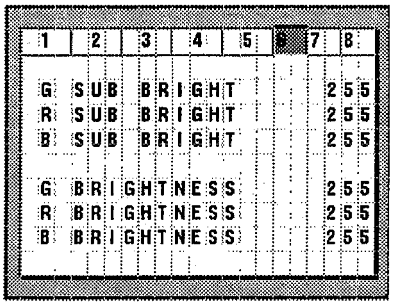
```
R GAIN              255
G GAIN              255
B GAIN              255

OSM COLOR GAIN      255
```

[TAB 5 (S)]



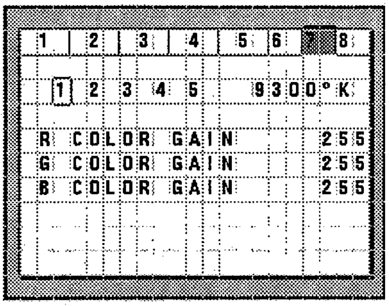
```
SUB BIAS            255

G BIAS              255
R BIAS              255
B BIAS              255
```

[TAB 6 (S)]



```
G SUB BRIGHT        255
R SUB BRIGHT        255
B SUB BRIGHT        255

G BRIGHTNESS        255
R BRIGHTNESS        255
B BRIGHTNESS        255
```

[TAB 7 (S)]



```
 1 2 3 4 5     9300°K

R COLOR GAIN        255
G COLOR GAIN        255
B COLOR GAIN        255
```

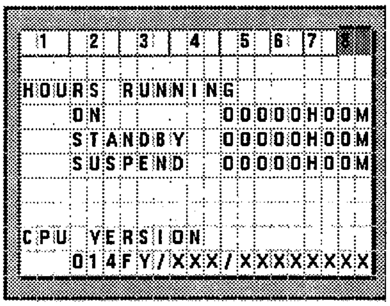
PRESET

No.1 (9300° K)　No.2 (7500° K)

No.3 (6500° K)　No.4 (5000° K)

No.5 (4200° K)

[TAB 8 (S)]



```
HOURS RUNNING
    ON          00000H00M
    STANDBY     00000H00M
    SUSPEND     00000H00M

CPU VERSION
    014FY/XXX/XXXXXXXX
```

ADJUSTMENT ITEMS

[A] Adjustment of SW. REG. ⚠

1. Adjustment method
2. Adjustment procedure

[B] Pre-Adjustment

1. High-Voltage Adjustment ⚠

[C] Initial Settings

[D] Main Adjustment

1. Heater Voltage Adjustment
2. Horizontal Hold Adjustment
3. Horizontal Raster Position
4. Horizontal Maximum Size Adjustment
5. Vertical Linearity Adjustment
6. Vertical Maximum Size Adjustment
7. Deflection Distortion Adjustment
    - 7-1. Horizontal / Vertical Size Rough Adjustment
    - 7-2. Picture Tilt Adjustment
    - 7-3. Side Pincushion Balance Adjustment
    - 7-4. Side Pincushion Adjustment
    - 7-5. Trapezoid distortion Adjustment
    - 7-6. Corner Distortion Adjustment
    - 7-7. Parallelogram Distortion Adjustment
    - 7-8. Synthetic Distortion
8. Preset Picture Size And Position Adjustment
9. Manual adjustment (use the alignment jig for good efficiency)
    *(As for step 4, step 5, step 7, step 8, it can be substituted in step 9.)
10. Video Amplitude Adjustment
    - 10-1. Settings
    - 10-2. Video Amplitude
    - 10-3. OSM Gain Adjustment
    - 10-4. Cut Off Adjustment ⚠
    - 10-5. Contrast Tracking Adjustment
    - 10-6. Brightness Tracking Adjustment
    - 10-7. Color Preset Adjustment
11. Focus Adjustment
12. CRT Purity Convergence

[E] Reference

1. Adjustment Signal
2. Timing of Adjustment Signals
3. Position of Connector / Test point of Adjustment

[A] Adjustment of SW.REG. ⚠

1. Specifications

1) Input voltage

A ver. : AC 100 V ～ 120 V
B / R ver. : AC 220 V ～ 240 V

2) Rated input voltage

A ver. : AC 85 V ～ 132 V
B / R ver. : AC 170 V ～ 264 V

3) Frequency 50 /60 Hz

4) Rated frequency 47 Hz ～ 63 Hz

5) DC output

ON STATE MODE

	+ 200 V	+ 80 V	+ 15 V
Maximum output current	0.21 A	0.65 A	1.40 A
Minimum output current	0.09 A	0.07 A	0.70 A
Range of voltage fluctuation	± 5 %	± 1 %	± 5 %

	+ 9.4 V	- 15 V	+ 5 V (floating)
Maximum output current	0.55 A	0.65 A	0.35 A
Minimum output current	0.30 A	0.36 A	0 A
Range of voltage fluctuation	± 8 %	± 5 %	± 20 %

2. Adjustment method

This Adjustment is performed at the inspection of SW PWB board.

1) Adjustment conditions

- Input voltage
  A ver. : AC 120 V ± 5 % 60 Hz
  B / R ver. : AC 220 V ± 5 % 50 Hz

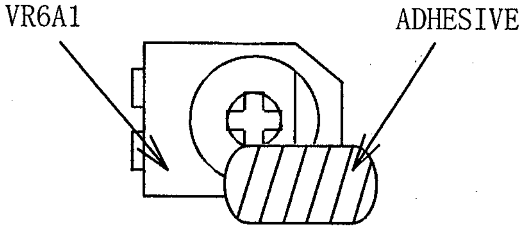
- Load during normal operating conditions

Output voltage	Output terminal	Load electric current	Load resistance
+ 200 V	K1 - K4	0.21 A	953 Ω
+ 80 V	K2 - K4	0.65 A	123 Ω
+ 15 V	K3 - K4	1.40 A	10 Ω
- 15 V	K5 - K4	0.65 A	23 Ω
+ 9.4 V	PM6 - PM9	0.55 A	17 Ω
+ 5 V (floating)	CU1 - CU3	0.35 A	14 Ω

NOTE) In order that an electric current flows to parts on MAIN PWB, value of a load electric current sometimes differs from the maximum electric current value.

2) Adjustment procedure

① Connect a load and a pulse generator with each output of power supply.
② Turn VR6A1 fully counterclockwise.
③ Set a DC power supply on +5V, and turn on a power switch.
④ Adjust a pulse to ON : 2 uS, OFF : 19 uS by turning volume of a pulse generator.
⑤ Turn on a power switch.
⑥ Adjust a voltage of V2 on +80V±0.05V by Turning VR6A1 clockwise.
⑦ After adjustment, fix VR6A1 in an adhesive (TSE-385RTV or Equality).


VR6A1
ADHESIVE

3) connection chart

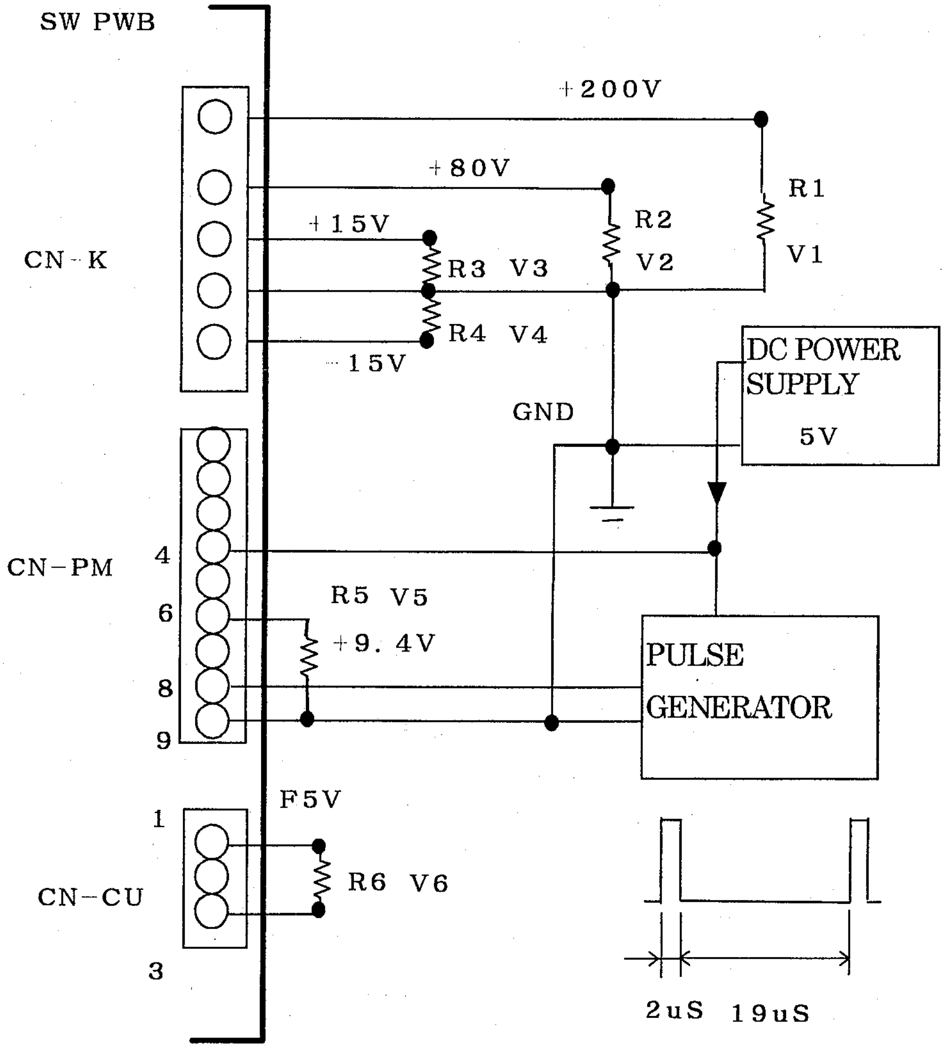

SW PWB
+200V
+80V
+15V
R1
R2
V1
V2
R3 V3
R4 V4
CN-K
-15V
DC POWER SUPPLY 5V
GND
CN-PM
4
6
8
9
R5 V5
+9.4V
PULSE GENERATOR
F5V
1
3
CN-CU
R6 V6
2uS
19uS

Fig. 1 (R1 ～ R6 : Electronic load resistors or load equipment)

[B] Pre-Adjustment

1. High-Voltage Adjustment ⚠ Signal 3 (VGA480) All Black

Initial Setting

SCREEN VR : Fully counterclockwise (MIN)
VR5R1 : Fully counterclockwise (MIN)

1) Receive signal 3.
2) Adjust VR5R1 slowly so that high voltage is 27kV±0.2kV.

> After adjusting , seal VR5R1 with a silicon adhesive and cap (74106841).

[C] Initial Settings

1. Control Setting

Before adjusting, set the position of control as follows.

FBT SCREEN VR :Fully counterclockwise(MIN)
FOCUS F1 :Mechanical center
FOCUS F1 :Mechanical center
VR581 : Fully counterclockwise(MIN)
VR401 : Mechanical center
SW582 :CN-CU (LEFT) side

[D] Main Adjustment

Use this manual for aligning the monitor.

(1) Push "RESET" SW to reset a highlighted item.
(2) Close menu and turn the power off.
(3) Turn the monitor back on and confirm that the adjustment values / contrast / white balance / distortion values are the same before the Menu was closed.
(When "PROCEED" SW is pushed by the condition which Menu (S) is displayed, OSM Menu will disappear. If "PROCEED" SW is pushed once more, OSM displays)

Previous setting

Signal : No. 3 (VGA480) All White

(1) Screen VR setting
Open Menu(U), TAB 2 "BRIGHTNESS & CONTRAST" and push "RESET" SW.
Adjust SCREEN VR so that the back-raster is just visible.
(2) FOCUS VR setting
Display OSM menu and adjust FOCUS VR to be able to recognize characters.

1. Heater voltage Adjustment Signal : No. 3 (VGA480) All White

※ 1 Adjust this monitor after a minimum of thirty minutes.

(1) Receive signal 3.
(2) Adjust VR7E1 so that heater voltage of TP-H on CRT PWB is 6.14 ± 0.05 V.
※ 2 Use a voltage meter with input impedance of 10M Ω minimum and (voltage range is 3 decimal point) is minimum 0.021V.

2. Horizontal Hold Adjustment

Signal: No.22 (HOLD-1 FH=31kHz) All White
No.26 (HOLD-2 FH=94kHz) All White

(1) Receive signal 22.
(2) Open Menu(S), TAB 1 "H.HOLD 1" and push "RESET" SW.(This is free run mode)
(3) Adjust SWs "+" and "-" so that there is one screen.
(4) Change Menu (S) "H.HOLD 1" to "H.HOLD 2" by "▼" SW.
(5) Receive signal 26.
(6) Open Menu(S), TAB 1 "H.HOLD 2" and push "RESET" SW.
(7) Adjust SWs "+" and "-" so that there is one screen.
(8) Push "▲" SW. (This is the normal screen)
(9) Receive signal 22.
(10) Check the screen that there is one image. If the screen is not stable, repeat steps (2) to (10).

3. Horizontal Raster Position

Signal: No.26 (HOLD_2 fH=94kHz) All Black

(1) Receive signal 26.
(2) Adjust SCREEN-VR on the FBT so that the back raster just appears.
(3) Make sure to set the position of control as follows.
VR582: Fully clockwise(MAX)
SW582: Set position to the CN-CU side
(4) Open Menu(S), TAB2 "NARROW/WIDE", Horizontal Size and adjust "+", "-" SW so that the horizontal size is 384±2.0 mm.
(5) If raster has approached on the left of displayed area, switch SW582 position to the left side of CN-CU. If raster has approached on the right of displayed area, switch SW582 position to the right side of C58P.
(6) Adjust VR582 so that the distance between the bezel and raster edge is as follows.

$$| X_{Left} - X_{Right} | \leqq 1.0 \text{ mm}$$

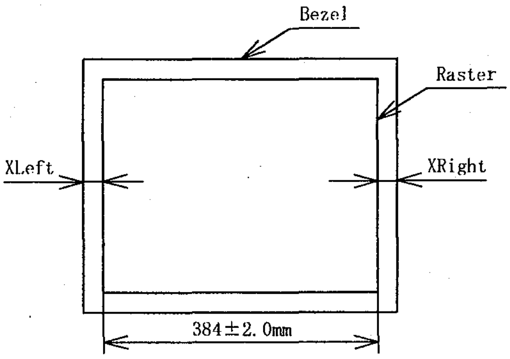


Fig 3-1 Horizontal Raster Centering

4. Horizontal Maximum Size Adjustment Signal 23 (H.MAX) All Green

(1) Receive signal 23.
(2) Open Menu(S), TAB2 "SHORT / TALL" and adjust "+", "-" SW so that the vertical size is 288 ±5 mm.
If not able to set vertical size, adjust VR401 on the OSC PWB.
(3) Open Menu(S), TAB3 "IN / OUT" and adjust "+", "-" SW to correct side pincushion distortion.
(4) Open Menu(S), TAB1 "H.SIZE MAX" and make sure that "H.SIZE MAX" is set to 0.
(5) Open Menu(S), TAB2 "NARROW/WIDE" and adjust "+", SW so that the horizontal size is maximum.
(6) Open Menu(S), TAB1 "H.SIZE MAX" and adjust "+", "-" SW so that the horizontal size is 384 mm ± 2 mm.
(7) Push "EXIT" SW.

5. Vertical Linearity Adjustment

Signal: No. 25 (V.MAX) All White
Signal: No. 21 (1600*1200@75Hz) Cross hatch pattern

(1) Receive signal 25.
(2) Open Menu(S), TAB2 "DOWN / UP" and adjust "+", "-" SW so that the picture is centered with in the screen.
(3) Open Menu(S), TAB2 "SHORT / TALL" and adjust "+" SW to data of 255 (MAX).
Adjust VR401 on the OSC PWB so that the vertical size is about 288 mm.
(4) Receive signal 21.
(5) Open Menu(S), TAB2 "DOWN / UP" and adjust "+", "-" SW so that the picture is centered with in the screen.
(6) Open Menu(S), TAB2 "SHORT / TALL" and adjust "+", "-" SW so that the vertical size is 288 ±3mm.
(7) Open Menu(S) TAB2 "V.LINEARITY" and adjust "+", "-" SW to make size of top square and bottom square on the screen equal vertically.

Note: When a Menu is hidden temporarily for picture adjustment, push "PROCEED" SW once to display service Menu.

(8) Open Menu(S) TAB2 "V.LIN.BALANCE" and adjust "+", "-" SW to make size of top square and bottom square on the screen equal vertically.
(9) Make sure that the linearity of top, center, and bottom on the screen are ±3% or less.
(10) Push "EXIT" SW.

6. Vertical Maximum Size Adjustment Signal: No. 25 (V.MAX) All white

(1) Receive signal 25.
(2) Open Menu(S), TAB2 "DOWN / UP" and adjust "+", "-" SW so that the picture is centered with in the screen.
(3) Open Menu(S), TAB2 "SHORT/TALL" and adjust "+", SW so that the data is 255(MAX).
(4) Adjust VR401 on the OSC PWB so that the vertical size is 288 mm ± 2 mm.

7. Deflection Distortion Adjustment

Note: Turn the CRT face to east and degauss the monitor using an external degaussing coil.

7-1. Horizontal / Vertical Size Rough Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB2 "LEFT / RIGHT", "DOWN / UP", "NARROW / WIDE", "SHORT / TALL" and adjust the screen size to the following values.

Horizontal Size:	384 mm ± 5 mm
Vertical Size:	288 mm ± 2 mm

Note: Hide the OSM Menu when confirming the adjustments.

7-2. Picture Tilt Adjustment

Signal: No. 15 (1024*768@75Hz) Cross Hatch Pattern

(1) Receive signal 15.

(2) Make sure that initial value of adjustment data is "127".

(3) Turn the CRT face to east and degauss the monitor using an external degaussing coil.

(4) Make sure that the picture tilt meets the following specification.

$X1 \leqq \pm 2.0$ mm

If out of specification, correct CRT assembly.

(5) Open Menu(S) TAB3 "ROTATE" and make sure that the picture is tilted as follows by "+", "-" SW.

"-" SW : counterclockwise

"+" SW : clockwise

(5) Open Menu(S) TAB3 "ROTATE" and adjust "+", "-" SW so that the picture tilt meets the following standards. The maximum correction is ±1.0mm.

$X2 \leqq \pm 1.0$ mm

(6) Push "EXIT" SW.

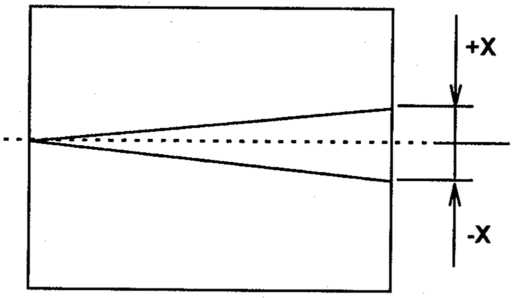


FIG 7-1 Picture Tilt

7-3. Side Pincushion Balance Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB3 "LEFT / RIGHT".
Adjust "+", "-" SW so that the difference of X_{sl} and X_{sr} is equal (maximum 1.0 mm).

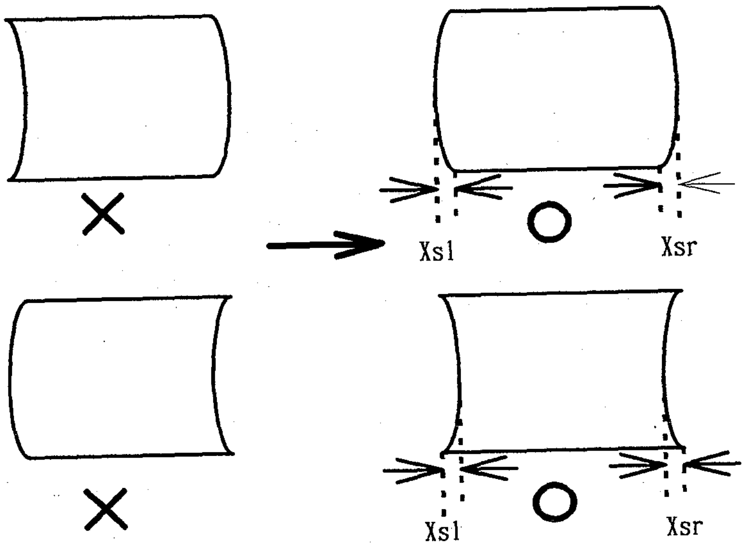


FIG 7-2 Side Pincushion Balance

7-4. Side Pincushion Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB3 "IN / OUT".
Adjust "+", "-" SW so that the side pincushion distortion is small (maximum ± 0.5 mm).

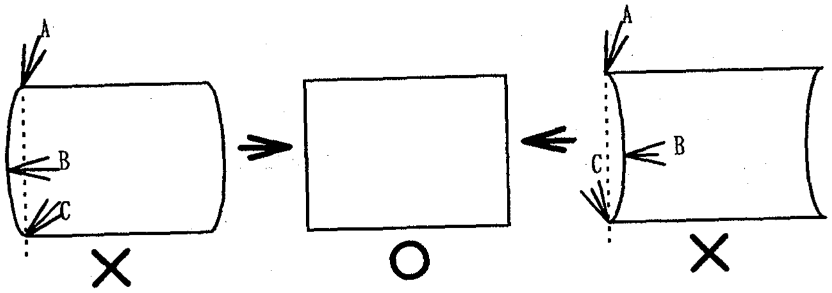


FIG 7-3 Side Pincushion

7-5. Trapezoid Distortion Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB3 "ALIGN".

Adjust "+", "-" SW so that the Trapezoid Distortion is equal to Xtop and Xbtm. (| Xtop - Xbtm | ≦ 1.0 mm)

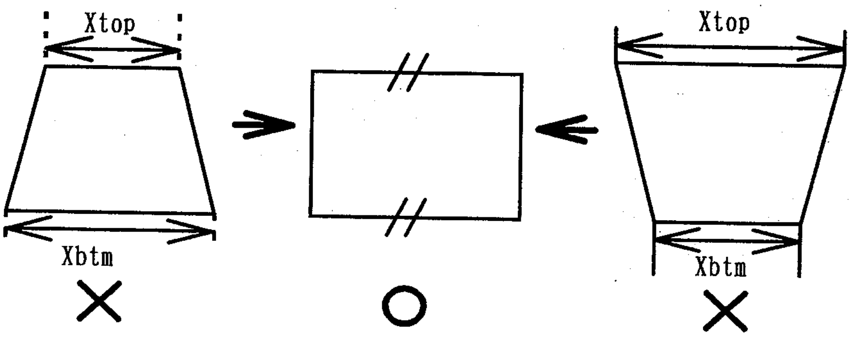


FIG 7-4 Trapezoid Distortion

7-6. Corner Distortion Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB3 "CORNER".

Adjust "+", "-" SW so that the corner forms a right angle. (maximum ± 1.0 mm)

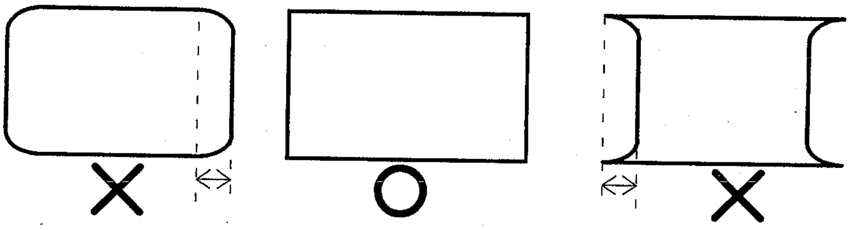


FIG 7-5 Corner Distortion

7-7. Parallelogram Distortion Adjustment

Signal: No. 15 (1024*768@75Hz) Cross Hatch Pattern

(1) Open Menu(S), TAB3 "TILT".

Adjust "+", "-" SW so that the vertical line and horizontal line at the screen's center fall at right angles. (maximum 90° ± 0.5°)

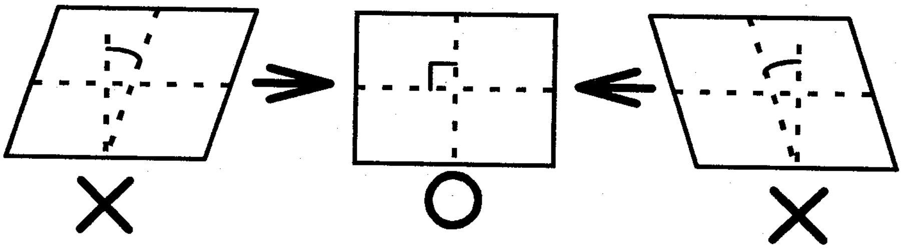


FIG 7-6 Parallelogram Distortion

7-8. Synthetic Distortion

Signal: No. 15 (1024*768@75Hz) All white

(1) Synthesize steps 7-2 to 7-7 and make sure that each step's standard is met.

(2) If undulating, correct within each standard for each adjustment step.
Undulation is a directional difference of tilt at either AC and CE or both.
Following figures (I) and (II) are example. AB and BC, CD and DE are the direction of tilt.
Undulated correction is the same direction of tilt at AB and BC, CD and DE.
Following figures (III) and (IV) are example. In this state, each standard must be met.

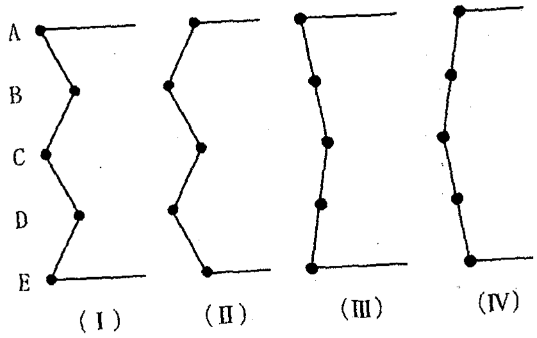


FIG 7-7 Undulated Definition

8. Preset Picture Size and Position Adjustment

Signal:	No. 3 (VGA480)	No.13 (800*600@85Hz)
	No. 5 (MAC 640*480)	No.15 (1024*768@75Hz)
	No.11 (VESA 640*480@85Hz)	No.20 (1280*1024@75Hz)
	No.12 (MAC 832*624)	No.21 (1600*1200@75Hz)
Video:	All White	

(1) Receive signal 3.

(2) Open Menu(S), TAB2 "LEFT / RIGHT", "DOWN / UP", "NARROW / WIDE", "SHORT / TALL".

(3) Adjust the picture size and position as listed below by "+", "-" SW.

Picture size

H : 384±1.0 mm

V : 288±1.0 mm

Picture Position

H : $| X_{Left} - X_{Right} | \leqq 1.0$ mm

V : $| X_{top} - X_{Bottom} | \leqq 1.0$ mm

(4) Push "EXIT" SW.

(5) Receive the next signal and repeat steps (2) - (4).

Note: Before receiving the next signal, always push "EXIT" SW to store adjustments.

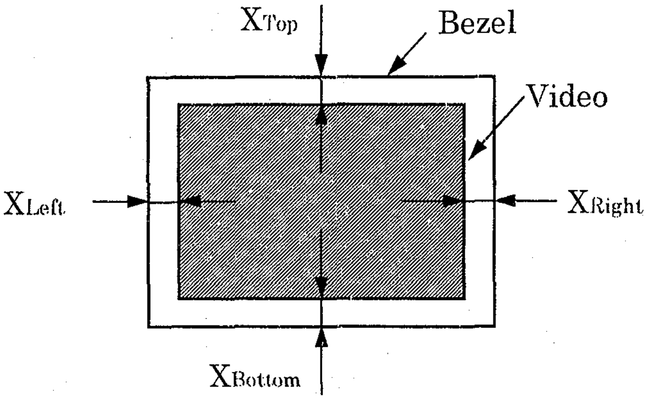


FIG 8-1 Picture Position

(6) For the signals below, picture size and position are calculated from above adjustment data and data are written into EEPROM.

Signal:	No. 1 (VGA350)	No. 9 (XGA)
	No. 2 (VGA400)	No.10 (VESA800*600 @75Hz)
	No. 4 (800*600@60Hz)	No.14 (1024*768@70Hz)
	No. 6 (VESA350 @85Hz)	No.16 (1280*1024@60Hz)
	No. 7 (VESA400 @85Hz)	No.17 (Mac1152*870)
	No. 8 (VESA640*480 @75Hz)	No.18 (1024*768@70Hz)
		No.19 (1280*1024@70Hz)

H : 384 mm   V : 288 mm

9. Manual adjustment (use the adjustment jig for good efficiency)

A. Purpose of the procedure

Advantage to use this jig is as follows

① Shorten Adjustment Time

Adjustment of Display Size , Positioning and Distortion can be done within 2 minutes by using this jig (Normally it takes around 15 minutes.)

② All adjustment for Size, Position and Distortion can be done from PC. by using this jig. Adjustment for Size and Position for all preset signal can be done by selecting only one specified signal (MAC Ⅱ 832*624).

③ Following Adjustment can be done automatically by using this jig.

- (1) Horizontal Phase Adjustment
- (2) Vertical position Adjustment
- (3) Horizontal Size Adjustment
- (4) Vertical Size Adjustment
- (5) Trapezoid Distortion Adjustment

④ High level of skill for adjustment is not required.

B. Equipments for Adjustment

(1) AUTO ADJ I/F jig	1pc.
(2) ADJ Cable 15p-8p	1pc.
(3) ADJ Cable 8S-8S	1pc.
(4) The software for AUTO ADJ I/F jig	1pc.
(5) PC (IBM PC AT or Compatible)	1pc.
(6) Printer Cable	1pc.

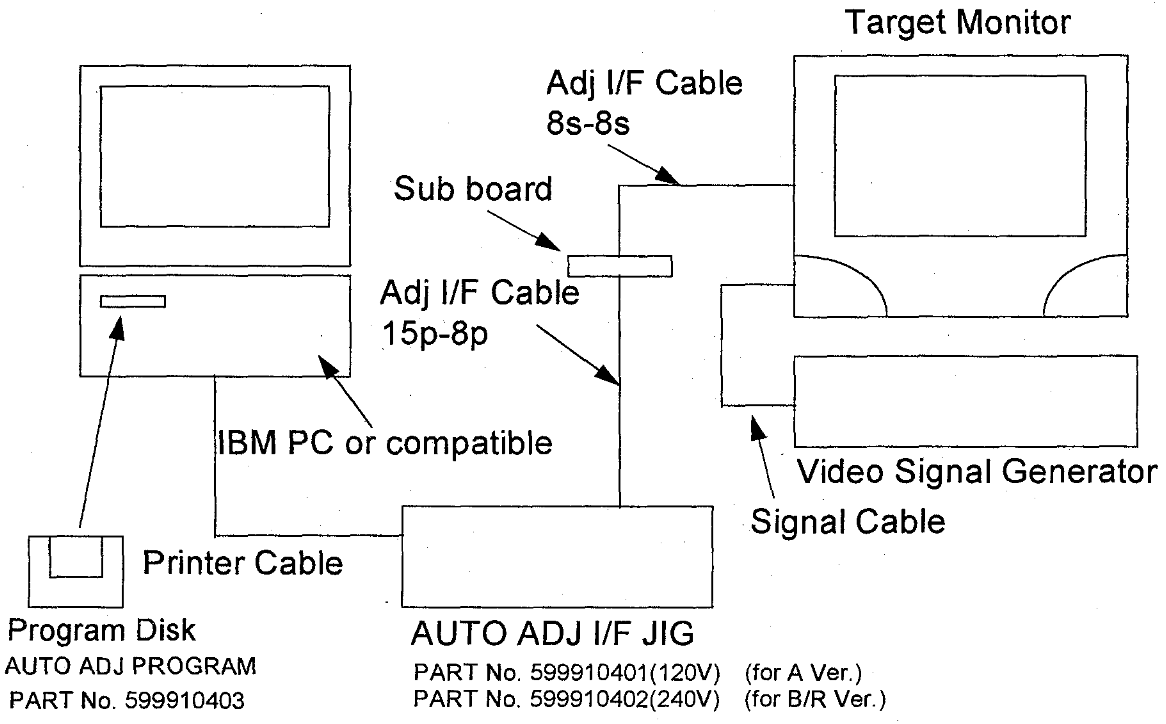
Note) items (5) and (6) should be prepared at your side

C. Operation

(1) Connection

1. Connect ADJ CABLE 15P-8P ("CN-ADJ") to AUTO ADJ I-F JIG.
2. Connect Printer Cable ("CN-PRN") to AUTO ADJ I/F JIG and PC.
3. Connect ADJ CABLE 8S-8S ("CN-AJ") to ADJ CABLE 15P-8P ("CN-ADJ") and CN-AJ of PWB of Monitor.

This jig should be connected as shown below


Target Monitor
Adj I/F Cable
8s-8s
Sub board
Adj I/F Cable
15p-8p
IBM PC or compatible
Video Signal Generator
Signal Cable
Printer Cable
Program Disk
AUTO ADJ PROGRAM
PART No. 599910403
AUTO ADJ I/F JIG
PART No. 599910401(120V) (for A Ver.)
PART No. 599910402(240V) (for B/R Ver.)

Jig Parts

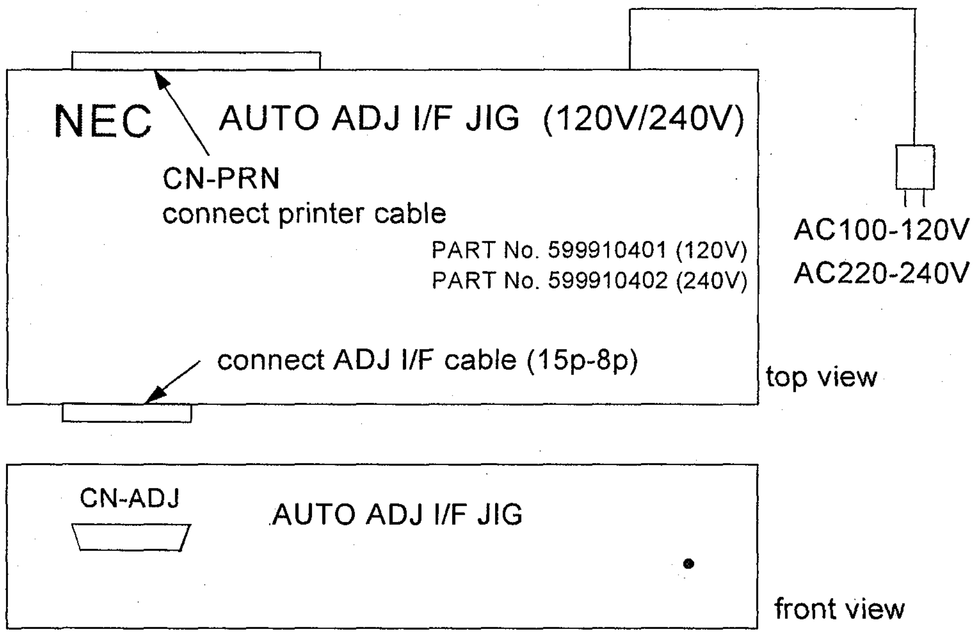

NEC
AUTO ADJ I/F JIG (120V/240V)
CN-PRN
connect printer cable
PART No. 599910401 (120V)
PART No. 599910402 (240V)
AC100-120V
AC220-240V
connect ADJ I/F cable (15p-8p)
top view
CN-ADJ
AUTO ADJ I/F JIG
front view

Fig 1 AUTO ADJ I/F JIG

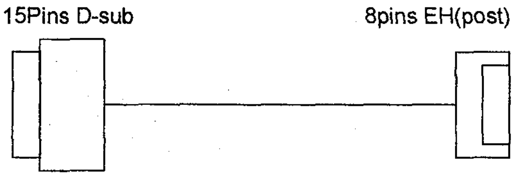

15Pins D-sub
8pins EH(post)

Fig 2 ADJ CABLE 15P-8P

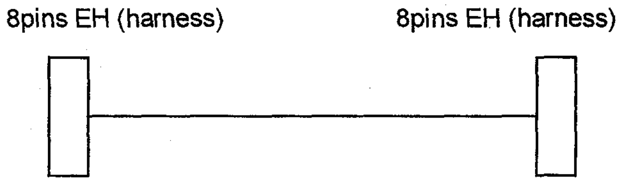

8pins EH (harness)
8pins EH (harness)

Fig 3 ADJ CABLE 8S-8S

(2) Operation

1. Insert FD of Software for AUTO ADJ I/F jig into PC.
2. Then Power on the PC, the AUTO ADJ I/F jig and Monitor.
3. In case of using model P1150, use file "2145.bat".

(3) Adjustment Procedures

Following message will appear on Monitor Screen , when input a file name in PC.

```
Size/Position Distortion Manual Adjust Program Version 1.02

        ROM READ ? (Y/N) or END (E)               MODEL:

        Y: INITIAL DATA = READING SET             JC-2145
        N: INITIAL DATA = PARAMETER FILE
```

When a key "Y" is pushed :

PC begins to read the Data which is saved in EEPROM of Monitor, and begins to adjust the monitor using the read Data as a reference.

When a key "N" is pushed :

PC begins to adjust the monitor according to the Data saved in PROGRAM/DISK as reference Data.

Note) Push a key "N", when it is concluded that the Screen size and Positioning do not work well and the data is destroyed. Also push a key "N", when it is not concluded.

When a key "E" is pushed :

PC ends adjustment procedure.

Adjustment procedure should be done based on Adjustment Procedure of Service Manual for each Model.

The following menu will appear on screen at the start menu , when a key "Y" or "N" is pushed.

```
 1 : Size / Position
 2 : Distortion
 3 : USER INITIALIZE
 4 : END
                No. ?
```

Start Menu

Meaning of the menu is as follows.

1 : Size / Position"	: Adjustment of Size and Position
2 : Distortion"	: Adjustment of Distortion
3 : USER INITIALIZE"	: Enter Data of Size and Position to USER signal.
4 : END"	: Return to start menu.

Please follow the item below steps for the adjustment.

1. USER INITIALIZE
2. Distortion

   (If this item is adjusted after Vertical Size / Position is done in this item, Vertical Data may be possible change.)
3. H. SIZE (MAX)
4. Horizontal / Vertical Size and Position

(4) Distortion adjustment

In "Start Menu" message

When "2 : Distortion" is selected , following menu will be displayed on screen.

```
Distortion Adjust

1: ROTATION
2: PARALLELOGRAM
3: TRAPEZOID
4: PIN CUSHION
5: PIN CUSHION BALANCE
6: CORNER
7: V.LINEAR
8: V.LINEAR BALANCE
9: END
```

Then type "1" and push "ENTER" key to change signal of Signal Generator to 1024*768(75).

When No. "1" is selected, following will be displayed.

```
           Distortion Adjust

           1: ROTATION
           2: PARALLELOGRAM
           3: TRAPEZOID
           4: PIN CUSHION
           5: PIN CUSHION BALANCE
           6: CORNER
           7: V.LINEAR
           8: V.LINEAR BALANCE
           9: END

                       No. ?     3
           DAC VALUE : 121
Decrease : 1(-1), 4(-5),7(-10)   Increase : 3(+1),6(+5),9(+10)   Original: 5
END(NO WRITE) : e E     END(WRITE) :ENTER
```

Each item is adjusted.

Function of Each key is as follows.

“1” : DAC value decreases by 1 (H. SIZE becomes smaller)
“4” : DAC value decreases by 5
“7” : DAC value decreases by 10

“3” : DAC value increases by 1 (H. SIZE expands)
“6” : DAC value increases by 5
“9” : DAC value increases by 10

“5” : Set up data value to reference value.
“e” or “E” : Ends without saving data.
“ENTER” : Ends after saved data.

(5) Horizontal / Vertical Size and Position Adjustment

In “Start Menu” message

When “1 : Size / Position” is selected , following menu will be displayed on screen.

```
1:VGA350                      JC-2145
2:VGA400                      SIZE/POSITION ADJUSTMENT
3:VGA480
4:800*600(60)
5:MAC2(640*480)
6:VESA350(85)
7:VESA400(85)
8:VESA640*480(75)
9:XGA
10:VESA800*600(75)
11:640*480(85)
12:MAC2(832*624)
13:800*600(85)                Select No.
14:1024*768(70)               No.   ?
15:1024*768(75)
16:1280*1024(60)
17:MAC_1152
18:1024*768(85)
19:1280*1024(70)
20:1280*1024(75)
21:1600*1200(75)
23:H.SIZE(MAX)
80:TOTAL(1024*768(75))
82:END
```

A) H.SIZE(MAX) Adjustment

Then type “23” and push “ENTER” key to change signal of Signal Generator to H.SIZE(MAX).

When No. “23” is selected, following will be displayed.

```
Size/Position Adjust
SIGNAL : H.SIZE(MAX)
        1:H.POSI
        2:V.POSI
        3:H.SIZE
        4:V.SIZE
        5:H.SIZE(MAX)
        6:END
      No. ?
```

When No.”3” is selected , following menu will be displayed.

```
Size/Position Adjust

        SIGNAL : H.SIZE(MAX)
        1:H.POSI
        2:V.POSI
        3:H.SIZE
        4:V.SIZE
        5:H.SIZE(MAX)
        6:END

        No. ?      3
        DAC VALUE : 126
Decrease : 1(-1), 4(-5),7(-10)    Increase : 3(+1),6(+5),9(+10)    Original: 5
END(NO WRITE) : e E        END(WRITE) :ENTER
```

Push key “5” to set up reference value. And then push one of key “3” or “6” or “9” to set up data to 255.

Note) If screen is over scanned by smaller value than 255 , push “ENTER” key to end “H.SIZE” adjustment.

Then select “5 : H.SIZE (MAX)” , decrease the Horizontal Size , and again set up data value to 255 at “H.SIZE” adjustment procedure.

In this case , be careful not to shrink horizontal size too small by “5 : H.SIZE (MAX)”

Push key “e” and return to menu of Size / Position , and select “5 : H.SIZE (MAX)”.

And adjust horizontal size to 384mm.

Push key “ENTER” to ends the adjustment.

B) Horizontal / Vertical Size and Position Adjustment

Then type “80” and push “ENTER” key to change signal of Signal Generator to 1024*768(75).

When No. “80” is selected, following will be displayed.

```
Size/Position Adjust

SIGNAL :TOTAL(1024*768(75))
          1:H.POSI
          2:V.POSI
          3:H.SIZE
          4:V.SIZE

          6:END
        No. ?
```

Each item is adjusted.

(6) Supply signal from 1 to 21 and make sure that Size / Position, Distortion within a standard every each signal. As for out of the inspection standards, that signal should be adjusted again.

(Note)

This program be used IBM computers.

This program control IBM computer using the parallel port.

The I/O port of the parallel port be different by IBM computer types.

Open a parameter file and change value of a parallel port when if a program does not act.

(example)

Parallel port setting (Parameter file)

```
PRI_DATA_ADR   378
PRI_BUSY_ADR   379
```

When it is above-mentioned example, 378, an input port amount to 379 as for an output port of a parallel port.

D. Programming flow chart

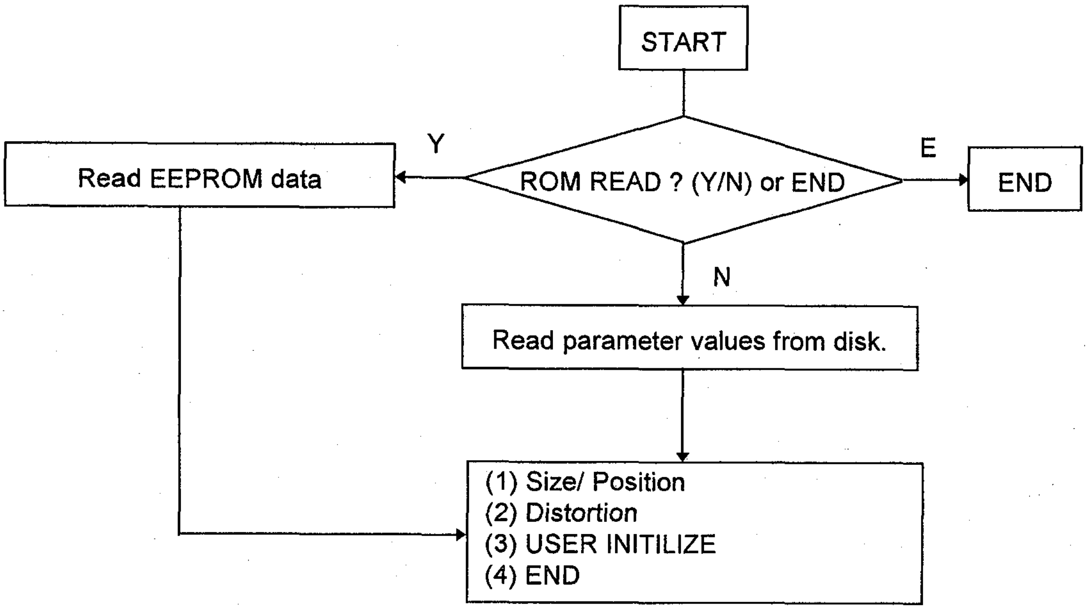

START
ROM READ ? (Y/N) or END
Y
E
N
Read EEPROM data
END
Read parameter values from disk.
(1) Size/ Position
(2) Distortion
(3) USER INITILIZE
(4) END

Fig 4 A start of service adjustment program

10. Video Amplitude Adjustment Signal: No. 24 (Mac832*624) Window pattern

10-1. Settings

(1) Confirm that the video signal of generator is as follows.
Video: Analog 0.7 V p-p ± 0.01V p-p (terminated 75 ohms ± 1 %)

(2) Open Menu(S), TAB7 "1".

(3) Adjust "+" SW " so that the "R COLOR GAIN", "G COLOR GAIN", B COLOR GAIN" data are all 255.

(4) Open Menu(S), TAB6 "G SUB BRIGHT" and push "RESET" SW.

(5) Adjust "-" SW " so that the "G SUB BRIGHT", "R SUB BRIGHT", "B SUB BRIGHT" data are all 0.

(6) Open Menu(S), TAB6 "G BRIGHTNESS" and push "RESET" SW.
Adjust "+","-" SW " so that the "G BRIGHTNESS", "R BRIGHTNESS", "B BRIGHTNESS" data are all 127.

(7) Open Menu(S), TAB5.

(8) Adjust "-" SW " so that the "G BIAS", "R BIAS", "B BIAS" data are all 0.

(9) Open Menu(S), TAB4.

(10) Adjust "-" SW " so that the "R GAIN", "G GAIN", "B GAIN" data are all 0.

(11) Push "EXIT" SW.

10-2. Video Amplitude

Signal: No.24 (MAC 832*624) Window Pattern

(1) Receive the signal 24.

(2) Open Menu(S), TAB4.

(3) Adjust "+", "-" SW so that TP-R (R GAIN), TP-G (G GAIN), TP-B (B GAIN) on the CRT PWB is set to 45 Vp-p.(+1V/ -0V)

(4) Push "EXIT" SW.

※ When adjusting video amplitude, move cursor to desired function and push PROCEED button to hide the OSM menu. Adjustment can be made with OSM menu hidden. OSM menu must be hidden since its amplitude will appear on the wave form.

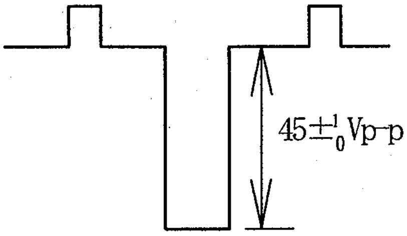


FIG 10-1 Wave form of RK, GK, BK

10-3. OSM Gain

Signal: No.24 (MAC 832*624) all black

(1) Receive signal 24.
(2) Open Menu(S), TAB4 “OSM COLOR GAIN”.
(3) Adjust “+”, ”-” SW so that OSM video amplitude at TP-G on the CRT PWB is set to 40 (+ 1, - 0) Vp-p.
(4) Push "EXIT" SW.

10-4. Cut off

Signal: No.24 (MAC 832*624) all black

(1) Receive signal 24.
(2) Connect the DVM with a high voltage probe at TP-G2 on the CRT PWB and adjust SCREEN VR to obtain 700 Vdc ± 5 Vdc. (Use a high voltmeter whose maximum voltage is more than 1.5kV and input resistance is more than 1000 M Ω.) ⚠
(3) Set 00 channel x, y, Y modes of color analyzer CA-100 and make sure that the following values are preset.

① A·R ver (K coat)	② B ver (TCO coat)
x = 0.273	x = 0.295
y = 0.300	y = 0.326
Y = 0.2 cd/㎡	Y = 0.2 cd/㎡

(4) Set analyzer mode at color analyzer.
(5) Open Menu(S), TAB5 and push “RESET” SW.
Note : Do not move to other tab and do not close OSM, because this condition is maintained until "10-5. Contrast Tracking Adjustment" is completed.
(6) Open Menu(S), TAB5 " SUB BIAS " and increase Sub Bias data. The first signal color that appears is the reference color and adjust "+", "-" SW so that its color analyzer indicated value is 100 ± 10.
Note 1: When the indicated value of the reference color is not 100 with Sub Bias date maximum, increase the reference color Bias and adjust the indicated values to obtain 100 ± 10.
Note 2: When the reference color does not appear in Sub Bias maximum data, increase Green Bias value and adjust the indicated value to obtain 100 ± 10.
(7) Increase the two color Biases data except the reference color and adjust each one to obtain 100 ± 10.

10-5. Contrast Tracking Adjustment

Signal: No.24 (MAC 832*624) Window Pattern

(1) Receive Signal 24.

(2) Confirm the condition is met in step 10-4 (5). (Open Menu(S), TAB5 and push "RESET" SW.)

(3) Open Menu(S), TAB5 "SUB BIAS" and push "RESET" SW.
Confirm the window brightness increase.
(If brightness becomes low, push RESET button again.)
※ In this tab 5 menu, you can change contrast max / min by pushing RESET button while the item is highlighted.

(4) Setting modes x, y, Y at the color analyzer, measure the window color temperature.
This measurement determines x=x1, y=y1.

(5) Open Menu(S), TAB5 "SUB BIAS" and push "RESET" SW.
Confirm that window brightness increase.

(6) Measure the window color temperature.
This measurement determines x=x2, y=y2.

(7) Open Menu(S), TAB5 "G BIAS", "R BIAS", "B BIAS" and make sure that the window color temperature are the following values :

$x2 = x1 \pm 0.003 \qquad y2 = y1 \pm 0.003$

(8) Open Menu(S), TAB5 "SUB BIAS" and push "RESET" SW.
Confirm that window brightness increase.

(9) Measure the window color and confirm that the readings are the following values :

$x1 = x2 \pm 0.003 \qquad y1 = y2 \pm 0.003.$

If not, repeat items (4) to (9).

(10) Push "EXIT" SW twice.

10-6. Brightness Tracking Adjustment

Signal: No.24 (MAC 832*624) all black

(1) Receive Signal 24.

(2) Open Menu(S), TAB5.

(3) Set modes x, y, Y at color analyzer.

(4) Measure the brightness on the screen center. When measurement is in excess of 3 cd/㎡, adjust "SUB BIAS" to obtain 2.5 ± 0.5 cd/㎡.

(5) Push "EXIT" SW.

(6) Open Menu(S), TAB6 "G SUB BRIGHT" and push "RESET" SW.
Adjust "+", "-" SW so that the "G SUB BRIGHT" is 5 ± 0.5 cd/㎡.

(7) Adjust "R SUB BRIGHT", "B SUB BRIGHT" and adjust "+", "-" SW so that the each color temperature measured in step 10-5.

$x = x1 \pm 0.003$

$y = y1 \pm 0.003$

(8) Push "EXIT" SW.

10-7. Color Preset

Signal: No.24 (MAC 832*624) Window Pattern
All Black

(1) Receive Signal 24(window pattern).

(2) Open Menu(S), TAB7 ,Color Preset No. “1 9300k ".

(3) Adjust "R COLOR GAIN", "G COLOR GAIN", "B COLOR GAIN" so that the color temperature is the following value.

x = 0.281 ± 0.003
y = 0.311 ± 0.003

(4) Receive Signal 24(All Black).

(5) Open Menu(S), TAB6 “G BRIGHTNESS” and push "RESET" SW.
Adjust " G BRIGHTNESS ", " R BRIGHTNESS ", " B BRIGHTNESS " so that the color temperature are the following values :

x = 0.281 ± 0.003
y = 0.311 ± 0.003

(6) Push "EXIT" SW.

(7) Open Menu(S), TAB7 ,and adjust Color Presets No.2 to 5 (7500K ~ 4200K) to the following values :

PRESET No.	x	y
2	0.300 ± 0.030	0.315 ± 0.030
3	0.315 ± 0.030	0.325 ± 0.030
4	0.345 ± 0.030	0.350 ± 0.030
5	0.385 ± 0.030	0.380 ± 0.030

11. Focus Adjustment

Signal: No. 3 (VGA480) Cross Hatch Pattern
No. 20 (1280*1024@75Hz) "$" character Pattern Cross Hatch Pattern (Green Color)
No. 28 (1280*1024@74Hz) Cross Hatch Pattern

※ After maximum horizontal amplitude adjustment, maximum vertical amplitude adjustment, and video adjustment are completed, perform this focus adjustment.
For steps of 5) ~ 13), adjust it with signal input through BNC using signal generator VG-819 or alternate.

(1) Receive Signal 28 (1280*1024(74Hz) Cross Hatch Pattern).

(2) Open Menu(s), TAB2 “NARROW / WIDE”. Adjust horizontal screen size to obtain the following values.

H : 360 ± 1mm

(3) Open Menu(s), TAB2 “SHORT / TALL”. Adjust vertical screen size to obtain the following values.

V : 288 ± 1mm

(4) Open Menu(s), TAB1.
Adjust the voltage at TP-DF on the DEF PWB to obtain the following values.
For the horizontal cycle voltage adjustment, use H. D. FOCUS VR.
For the vertical cycle voltage adjustment, use V. D. FOCUS.

Horizontal cycle : 475 V ± 10 Vp-p
Vertical cycle : 160 V ± 5 Vp-p

Note: When measuring Vp-p, use a 100:1 probe with capacitance of approx. 2pF.

(5) Push "EXIT" SW.

(6) Receive Signal 20 (1280*1024(75Hz) Cross Hatch Pattern (Green Color)).

※ Set up in user menu to 18) from 7). However, except item of 17.

(7) Open Menu(U), TAB1.
Adjust “CONTRAST” is MAX , and adjust “BRIGHTNESS” is the back raster just disappears.

(8) Open Menu(U), TAB2 “NARROW / WIDE” and “SHORT / TALL”.
Adjust picture size to max in bezel.

(9) Adjust FOCUS VR F2 on the FBT to the thinnest vertical lines.

(10) Adjust FOCUS VR F1 on the FBT to the thinnest horizontal lines.

(11) Repeat steps (9) and (10) and adjust for uniform focus on the whole screen.
Confirm that horizontal lines do not form halos.

(12) Receive Signal 20 (1280*1024(75Hz) "$" character Pattern).

(13) Make sure that the white "$" characters are crisp as possible.

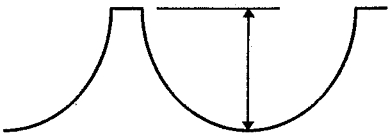
(14) When the focus is not obtained in step (13) , adjust FOCUS VR F1 so that the whole screen is uniform.

(15) When the focus is not obtained in step (14) , adjust FOCUS VR F1 and F2 so that the whole screen is uniform. (Note : Adjust it so as certainly to become an end by adjustment F1 VR.)

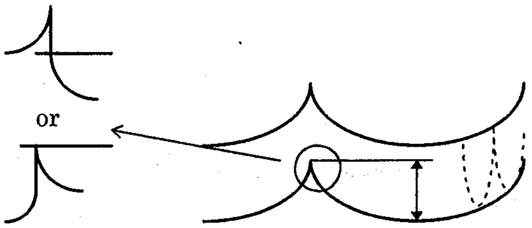
(16) In above adjustment , when the focus is not uniform through out the screen , each parabolic wave should be corrected with in ± 50 V at the horizontal cycle and to ± 20 V at the vertical cycle.
After corrections , perform steps (7) to (15) again.

(17) Open Menu(U), TAB1 and push “RESET”.
"WARNING" message will display, and return to origin by push PROCEED button.
Open Menu(U), TAB2 and push “RESET”.
"WARNING" message will display, and return picture size to factory preset by pushing PROCEED button.

(18) Receive Signal 3 (VGA480 Cross Hatch Pattern) and make sure that R, G, B lines do not form halos.



Horizontal Cycle 475±10V



Vertical Cycle 160±5V

Fig 10-1 Dynamic Focus Wave Form

11. CRT Purity Convergence

Signal: No. 15 (1024*768@75) Cross Hatch Pattern

(1) The CRT face should be facing east and degauss the entire unit with an external degaussing coil.

(2) Receive the cross hatch pattern of signal 15 and make sure that the screen size is as shown.

H : 384 ± 2.0mm V : 288 ±2.0mm

(3) Measure misconvergence , by using following standards mentioned below.

① If it is over 0.21 mm at screen center, adjust the static convergence by using the 4-pole / 6-pole magnets on the CPM assembly.

② If misconvergence is less than 0.21 mm at screen center and if it is not satisfactory, open Menu(S), TAB3 "H. S. CONVER" and "V. S. CONVER". And adjust static convergence to correct.

A zone : $x, y \leqq 0.35$ mm

B zone : $x, y \leqq 0.4$ mm and $\sqrt{(x^2 + y^2)} \leqq 0.5$ mm

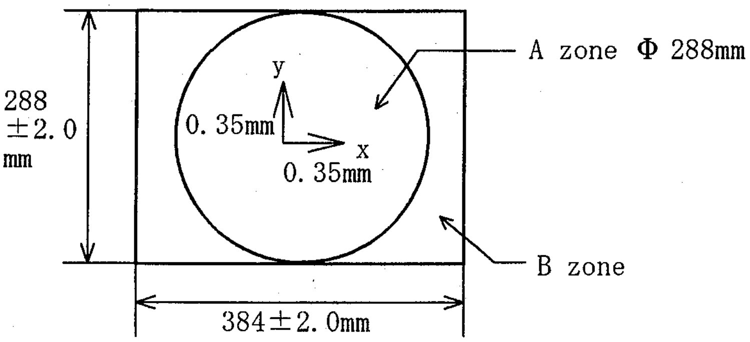


FIG 11-1 Convergence

[E]. Reference

1. Adjustment Signal

NO.	Signal Name	SYNC Form	SYNC Polarity(H/V)	
1	VGA 350	Separate	Pos/Neg	
2	VGA 400	Separate	Neg/Pos	
3	VGA 480	Separate	Neg/Neg	
4	800*600@60Hz	Separate	Pos/Pos	
5	MAC 640*480	Sync on G		
6	VESA 350@85Hz	Separate	Pos/Neg	
7	VESA 400@85Hz	Separate	Neg/Pos	
8	VESA 640*480@75Hz	Separate	Neg/Neg	
9	XGA	Separate	Pos/Pos	
10	VESA 800*600@75Hz	Separate	Pos/Pos	
11	VESA 640*480@85Hz	Separate	Neg/Neg	
12	MAC 832*624	Sync on G		
13	800*600@85Hz	Separate	Pos/Pos	
14	1024*768@70Hz	Separate	Neg/Neg	
15	1024*768@75Hz	Separate	Pos/Pos	
16	1280*1024@60Hz	Separate	Pos/Pos	
17	MAC 1152*870	Sync on G		
18	1024*768@85Hz	Separate	Pos/Pos	
19	1280*1024@70Hz	Sync on G		
20	1280*1024@75Hz	Separate	Pos/Pos	
21	1600*1200@75Hz	Separate	Pos/Pos	
22	H.HOLD1	Composit		※1
23	H.MAX	Separate	Neg/Neg	
24	MAC-832(Window)	Sync on G		
25	V.MAX	Separate	Neg/Neg	
26	H.HOLD2	Separate	Pos/Pos	※1
27	EDID	Separate	Neg/Neg	
28	1280*1024@74Hz	Separate	Neg/Neg	

※1 Please use the like following when fH can not be produced in circumstances of the signal generator and near value is used. As for 31 kHz sides, use a signal of the highest cycle by $fH \leqq 31.0$ kHz. As for 94kHz sides, use a signal of the lowest cycle by $fH \geqq 94$ kHz. (An error is 50Hz or less)

※2 Please supply the sync signal which is output from the signal generator to following.

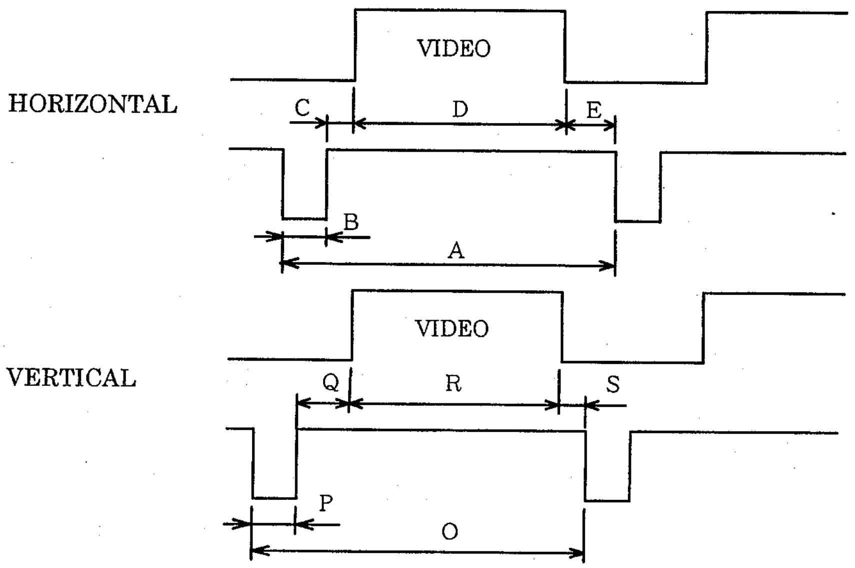
H/V COMPOSITE SIGNAL : To the non-adjustment set.
V.SYNC SIGNAL ONLY : To the color analyzer CA-100.

※3 Cross hatch pattern consist of the 17 vertical line and the 13 horizontal line.

2. Timing of Adjustment Signal

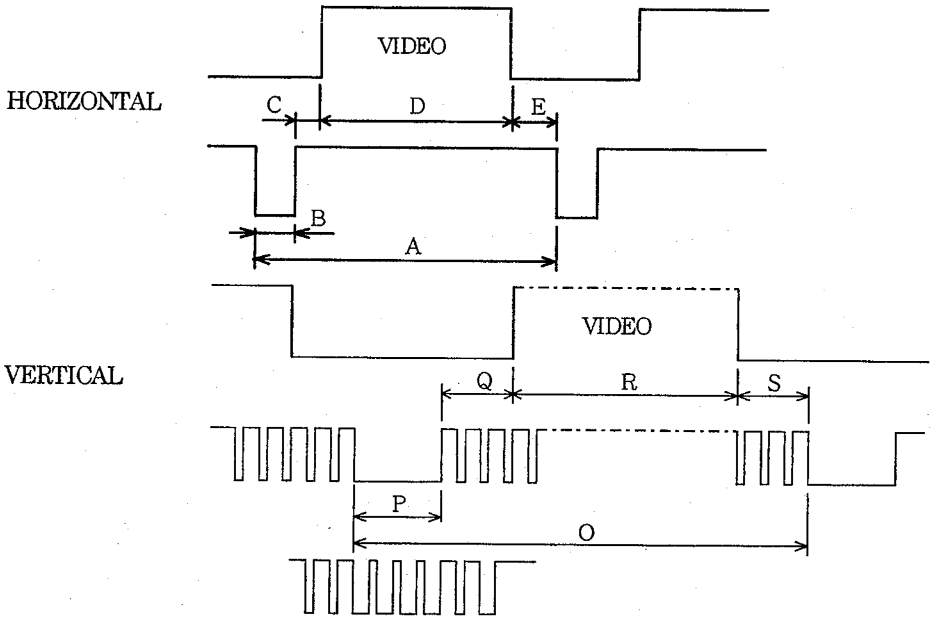
Signal Timing Charts

SEPARATE SYNC


VIDEO
HORIZONTAL
C
D
E
B
A
VIDEO
VERTICAL
Q
R
S
P
O

Sync Polarity : Positive/Negative

COMPOSITE SYNC


VIDEO
HORIZONTAL
C
D
E
B
A
VIDEO
VERTICAL
Q
R
S
P
O

Sync Polarity : Positive/Negative

Adjustment / Inspection Signal（1）

	TIMING NAME		TIMING NAME		TIMING NAME		TIMING NAME		TIMING NAME	
TIMING NAME	1 VGA 350		2 VGA 400		3 VGA 480		4 800*600@60Hz		5 MAC 640*480	
Pixel Clock		25.175 [MHz]		25.175 [MHz]		25.175 [MHz]		40.000 [MHz]		30.240 [MHz]
H.Frequency		31.469 [kHz]		31.469 [kHz]		31.469 [kHz]		37.879 [kHz]		35.000 [kHz]
V.Frequency		70.086 [Hz]		70.086 [Hz]		59.940 [Hz]		60.317 [Hz]		66.667 [Hz]
H.Tortal Time (A)	800 [dots]	31.778 [us]	800 [dots]	31.778 [us]	800 [dots]	31.778 [us]	1056 [dots]	26.400 [us]	864 [dots]	28.571 [us]
H.Addr Time (D)	640 [dots]	25.422 [us]	640 [dots]	25.422 [us]	640 [dots]	25.422 [us]	800 [dots]	20.000 [us]	640 [dots]	21.164 [us]
H.Blank Time	160 [dots]	6.356 [us]	160 [dots]	6.356 [us]	160 [dots]	6.356 [us]	256 [dots]	6.400 [us]	224 [dots]	7.407 [us]
H.Front Porch (E)	16 [dots]	0.636 [us]	16 [dots]	0.636 [us]	16 [dots]	0.636 [us]	40 [dots]	1.000 [us]	64 [dots]	2.116 [us]
H.Sync Time (B)	96 [dots]	3.813 [us]	96 [dots]	3.813 [us]	96 [dots]	3.813 [us]	128 [dots]	3.200 [us]	64 [dots]	2.116 [us]
H.Back Porch (C)	48 [dots]	1.907 [us]	48 [dots]	1.907 [us]	48 [dots]	1.907 [us]	88 [dots]	2.200 [us]	96 [dots]	3.175 [us]
V.Tortal Time (O)	449 [lines]	14.268 [ms]	449 [lines]	14.268 [ms]	525 [lines]	16.683 [ms]	628 [lines]	16.579 [ms]	525 [lines]	15.000 [ms]
V.Addr Time (R)	350 [lines]	11.122 [ms]	400 [lines]	12.711 [ms]	480 [lines]	15.253 [ms]	600 [lines]	15.840 [ms]	480 [lines]	13.714 [ms]
V.Blank Time	99 [lines]	3.146 [ms]	49 [lines]	1.557 [ms]	45 [lines]	1.430 [ms]	28 [lines]	0.739 [ms]	45 [lines]	1.286 [ms]
V.Front Porch (S)	37 [lines]	1.176 [ms]	12 [lines]	0.381 [ms]	10 [lines]	0.318 [ms]	1 [lines]	0.026 [ms]	3 [lines]	0.086 [ms]
V.Sync Time (P)	2 [lines]	0.064 [ms]	2 [lines]	0.064 [ms]	2 [lines]	0.064 [ms]	4 [lines]	0.106 [ms]	3 [lines]	0.086 [ms]
V.Back Porch (Q)	60 [lines]	1.907 [ms]	35 [lines]	1.112 [ms]	33 [lines]	1.049 [ms]	23 [lines]	0.607 [ms]	39 [lines]	1.114 [ms]
Scan Type	Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced	
H.Sync Polarity	Positive		Negative		Negative		Positive		Negative	
V.Sync Polarity	Negative		Positive		Negative		Positive		Negative	
	Separate		Separate		Separate		Separate		Sync on G	
TIMING NAME	6 VESA 350@85Hz		7 VESA 400@85Hz		8 VESA 640*480@75Hz		9 XGA		10 VESA 800*600@75Hz	
Pixel Clock		31.500 [MHz]		31.500 [MHz]		31.500 [MHz]		44.900 [MHz]		49.500 [MHz]
H.Frequency		37.861 [kHz]		37.861 [kHz]		37.500 [kHz]		35.522 [kHz]		46.875 [kHz]
V.Frequency		85.080 [Hz]		85.080 [Hz]		75.000 [Hz]		87.064 [Hz]		75.000 [Hz]
H.Tortal Time (A)	832 [dots]	26.413 [us]	832 [dots]	26.413 [us]	840 [dots]	26.667 [us]	1264 [dots]	28.151 [us]	1056 [dots]	21.333 [us]
H.Addr Time (D)	640 [dots]	20.317 [us]	640 [dots]	20.317 [us]	640 [dots]	20.317 [us]	1024 [dots]	22.806 [us]	800 [dots]	16.162 [us]
H.Blank Time	192 [dots]	6.095 [us]	192 [dots]	6.095 [us]	200 [dots]	6.349 [us]	240 [dots]	5.345 [us]	256 [dots]	5.172 [us]
H.Front Porch (E)	32 [dots]	1.016 [us]	32 [dots]	1.016 [us]	16 [dots]	0.508 [us]	8 [dots]	0.178 [us]	16 [dots]	0.323 [us]
H.Sync Time (B)	32 [dots]	1.016 [us]	32 [dots]	1.016 [us]	64 [dots]	2.032 [us]	176 [dots]	3.920 [us]	80 [dots]	1.616 [us]
H.Back Porch (C)	128 [dots]	4.063 [us]	128 [dots]	4.063 [us]	120 [dots]	3.810 [us]	56 [dots]	1.247 [us]	160 [dots]	3.232 [us]
V.Tortal Time (O)	445 [lines]	11.754 [ms]	445 [lines]	11.754 [ms]	500 [lines]	13.333 [ms]	408 [lines]	11.486 [ms]	625 [lines]	13.333 [ms]
V.Addr Time (R)	350 [lines]	9.244 [ms]	400 [lines]	10.565 [ms]	480 [lines]	12.800 [ms]	384 [lines]	10.810 [ms]	600 [lines]	12.800 [ms]
V.Blank Time	95 [lines]	2.509 [ms]	45 [lines]	1.189 [ms]	20 [lines]	0.533 [ms]	24 [lines]	0.676 [ms]	25 [lines]	0.533 [ms]
V.Front Porch (S)	32 [lines]	0.845 [ms]	1 [lines]	0.026 [ms]	1 [lines]	0.027 [ms]	0 [lines]	0.000 [ms]	1 [lines]	0.021 [ms]
V.Sync Time (P)	3 [lines]	0.079 [ms]	3 [lines]	0.079 [ms]	3 [lines]	0.080 [ms]	4 [lines]	0.113 [ms]	3 [lines]	0.064 [ms]
V.Back Porch (Q)	60 [lines]	1.585 [ms]	41 [lines]	1.083 [ms]	16 [lines]	0.427 [ms]	20 [lines]	0.563 [ms]	21 [lines]	0.448 [ms]
Scan Type	Non-Interlaced		Non-Interlaced		Non-Interlaced		Interlaced		Non-Interlaced	
H.Sync Polarity	Positive		Negative		Negative		Positive		Positive	
V.Sync Polarity	Negative		Positive		Negative		Positive		Positive	
	Separate		Separate		Separate		Separate		Separate	

Adjustment / Inspection Signal （2）

TIMING NAME	11 VESA 640*480@85Hz		12 MAC 832*624		13 800*600@85Hz		14 1024*768@70Hz		15 1024*768@75Hz	
Pixel Clock		36.000 [MHz]		57.283 [MHz]		56.250 [MHz]		75.000 [MHz]		78.750 [MHz]
H.Frequency		43.269 [kHz]		49.725 [kHz]		53.674 [kHz]		56.476 [kHz]		60.023 [kHz]
V.Frequency		85.008 [Hz]		74.550 [Hz]		85.061 [Hz]		70.069 [Hz]		75.029 [Hz]
H.Tortal Time (A)	832 [dots]	23.111 [us]	1152 [dots]	20.111 [us]	1048 [dots]	18.631 [us]	1328 [dots]	17.707 [us]	1312 [dots]	16.660 [us]
H.Addr Time (D)	640 [dots]	17.778 [us]	832 [dots]	14.524 [us]	800 [dots]	14.222 [us]	1024 [dots]	13.653 [us]	1024 [dots]	13.003 [us]
H.Blank Time	192 [dots]	5.333 [us]	320 [dots]	5.586 [us]	248 [dots]	4.409 [us]	304 [dots]	4.053 [us]	288 [dots]	3.657 [us]
H.Front Porch (E)	32 [dots]	0.889 [us]	32 [dots]	0.559 [us]	32 [dots]	0.569 [us]	24 [dots]	0.320 [us]	16 [dots]	0.203 [us]
H.Sync Time (B)	48 [dots]	1.333 [us]	64 [dots]	1.117 [us]	64 [dots]	1.138 [us]	136 [dots]	1.813 [us]	96 [dots]	1.219 [us]
H.Back Porch (C)	112 [dots]	3.111 [us]	224 [dots]	3.910 [us]	152 [dots]	2.702 [us]	144 [dots]	1.920 [us]	176 [dots]	2.235 [us]
V.Tortal Time (O)	509 [lines]	11.764 [ms]	667 [lines]	13.414 [ms]	631 [lines]	11.756 [ms]	806 [lines]	14.272 [ms]	800 [lines]	13.328 [ms]
V.Addr Time (R)	480 [lines]	11.093 [ms]	624 [lines]	12.549 [ms]	600 [lines]	11.179 [ms]	768 [lines]	13.599 [ms]	768 [lines]	12.795 [ms]
V.Blank Time	29 [lines]	0.670 [ms]	43 [lines]	0.865 [ms]	31 [lines]	0.578 [ms]	38 [lines]	0.673 [ms]	32 [lines]	0.533 [ms]
V.Front Porch (S)	1 [lines]	0.023 [ms]	1 [lines]	0.020 [ms]	1 [lines]	0.019 [ms]	3 [lines]	0.053 [ms]	1 [lines]	0.017 [ms]
V.Sync Time (P)	3 [lines]	0.069 [ms]	3 [lines]	0.060 [ms]	3 [lines]	0.056 [ms]	6 [lines]	0.106 [ms]	3 [lines]	0.050 [ms]
V.Back Porch (Q)	25 [lines]	0.578 [ms]	39 [lines]	0.784 [ms]	27 [lines]	0.503 [ms]	29 [lines]	0.513 [ms]	28 [lines]	0.466 [ms]
Scan Type	Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced	
H.Sync Polarity	Negative		Negative		Positive		Negative		Positive	
V.Sync Polarity	Negative		Negative		Positive		Negative		Positive	
	Separate		Sync on G		Separate		Separate		Separate	

TIMING NAME	16 1280*1024@60Hz		17 MAC 1152*870		18 1024*768@85Hz		19 1280*1024@70Hz		20 1280*1024@75Hz	
Pixel Clock		108.000 [MHz]		100.000 [MHz]		94.500 [MHz]		127.000 [MHz]		135.000 [MHz]
H.Frequency		63.981 [kHz]		68.681 [kHz]		68.677 [kHz]		74.910 [kHz]		79.976 [kHz]
V.Frequency		60.020 [Hz]		75.062 [Hz]		84.997 [Hz]		69.880 [Hz]		75.025 [Hz]
H.Tortal Time (A)	1688 [dots]	15.630 [us]	1456 [dots]	14.560 [us]	1376 [dots]	14.561 [us]	1696 [dots]	13.350 [us]	1688 [dots]	12.504 [us]
H.Addr Time (D)	1280 [dots]	11.852 [us]	1152 [dots]	11.520 [us]	1024 [dots]	10.836 [us]	1280 [dots]	10.080 [us]	1280 [dots]	9.481 [us]
H.Blank Time	408 [dots]	3.778 [us]	304 [dots]	3.040 [us]	352 [dots]	3.725 [us]	416 [dots]	3.270 [us]	408 [dots]	3.022 [us]
H.Front Porch (E)	48 [dots]	0.444 [us]	32 [dots]	0.320 [us]	48 [dots]	0.508 [us]	32 [dots]	0.250 [us]	16 [dots]	0.119 [us]
H.Sync Time (B)	112 [dots]	1.037 [us]	128 [dots]	1.280 [us]	96 [dots]	1.016 [us]	160 [dots]	1.260 [us]	144 [dots]	1.067 [us]
H.Back Porch (C)	248 [dots]	2.296 [us]	144 [dots]	1.440 [us]	208 [dots]	2.201 [us]	224 [dots]	1.760 [us]	248 [dots]	1.837 [us]
V.Tortal Time (O)	1066 [lines]	16.661 [ms]	915 [lines]	13.322 [ms]	808 [lines]	11.765 [ms]	1072 [lines]	14.310 [ms]	1066 [lines]	13.329 [ms]
V.Addr Time (R)	1024 [lines]	16.005 [ms]	870 [lines]	12.667 [ms]	768 [lines]	11.183 [ms]	1024 [lines]	13.670 [ms]	1024 [lines]	12.804 [ms]
V.Blank Time	42 [lines]	0.656 [ms]	45 [lines]	0.655 [ms]	40 [lines]	0.582 [ms]	48 [lines]	0.640 [ms]	42 [lines]	0.525 [ms]
V.Front Porch (S)	1 [lines]	0.016 [ms]	3 [lines]	0.044 [ms]	1 [lines]	0.015 [ms]	2 [lines]	0.026 [ms]	1 [lines]	0.013 [ms]
V.Sync Time (P)	3 [lines]	0.047 [ms]	3 [lines]	0.044 [ms]	3 [lines]	0.044 [ms]	4 [lines]	0.053 [ms]	3 [lines]	0.038 [ms]
V.Back Porch (Q)	38 [lines]	0.594 [ms]	39 [lines]	0.568 [ms]	36 [lines]	0.524 [ms]	42 [lines]	0.561 [ms]	38 [lines]	0.475 [ms]
Scan Type	Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced	
H.Sync Polarity	Positive		Negative		Positive		Negative		Positive	
V.Sync Polarity	Positive		Negative		Positive		Nagative		Positive	
	Separate		Sync on G		Separate		Sync on G		Separate	

Adjustment / Inspection Signal（3）

TIMING NAME	21 1600*1200@75Hz		22 H.HOLD 1		23 H.MAX		24 MAC-832(Window)		25 V.MAX	
Pixel Clock		202.500 [MHz]		27.900 [MHz]		30.240 [MHz]		57.283 [MHz]		50.000 [MHz]
H.Frequency		93.750 [kHz]		31.000 [kHz]		35.000 [kHz]		49.720 [kHz]		48.077 [kHz]
V.Frequency		75.000 [Hz]		59.048 [Hz]		66.667 [Hz]		74.550 [Hz]		72.188 [Hz]
H.Tortal Time (A)	2160 [dots]	10.667 [us]	900 [dots]	32.260 [us]	864 [dots]	28.571 [us]	1152 [dots]	20.110 [us]	1040 [dots]	20.800 [us]
H.Addr Time (D)	1600 [dots]	7.901 [us]	720 [dots]	25.810 [us]	608 [dots]	20.106 [us]	241 [dots]	4.207 [us]	800 [dots]	16.000 [us]
H.Blank Time	560 [dots]	2.765 [us]	180 [dots]	6.450 [us]	256 [dots]	8.465 [us]	911 [dots]	15.903 [us]	240 [dots]	4.800 [us]
H.Front Porch (E)	64 [dots]	0.316 [us]	18 [dots]	0.640 [us]	80 [dots]	2.645 [us]	327 [dots]	5.708 [us]	56 [dots]	1.120 [us]
H.Sync Time (B)	192 [dots]	0.948 [us]	108 [dots]	3.870 [us]	64 [dots]	2.116 [us]	64 [dots]	1.117 [us]	120 [dots]	2.400 [us]
H.Back Porch (C)	304 [dots]	1.501 [us]	54 [dots]	1.940 [us]	112 [dots]	3.704 [us]	520 [dots]	9.078 [us]	64 [dots]	1.280 [us]
V.Tortal Time (O)	1250 [lines]	13.333 [ms]	525 [lines]	16.935 [ms]	525 [lines]	15.000 [ms]	667 [lines]	13.414 [ms]	666 [lines]	13.887 [ms]
V.Addr Time (R)	1200 [lines]	12.800 [ms]	389 [lines]	12.548 [ms]	480 [lines]	13.714 [ms]	221 [lines]	4.444 [ms]	600 [lines]	12.510 [ms]
V.Blank Time	50 [lines]	0.533 [ms]	136 [lines]	4.387 [ms]	45 [lines]	1.286 [ms]	446 [lines]	8.970 [ms]	66 [lines]	1.377 [ms]
V.Front Porch (S)	1 [lines]	0.011 [ms]	52 [lines]	1.677 [ms]	3 [lines]	0.086 [ms]	203 [lines]	4.083 [ms]	37 [lines]	0.774 [ms]
V.Sync Time (P)	3 [lines]	0.032 [ms]	2 [lines]	0.065 [ms]	3 [lines]	0.086 [ms]	3 [lines]	0.060 [ms]	6 [lines]	0.124 [ms]
V.Back Porch (Q)	46 [lines]	0.491 [ms]	82 [lines]	2.645 [ms]	39 [lines]	1.114 [ms]	240 [lines]	4.827 [ms]	23 [lines]	0.479 [ms]
Scan Type	Non-Interlaced		Non-interlaced		Non-Interlaced		Non-interlaced		Non-interlaced	
H.Sync Polarity	Positive		Positive		Negative		Negative		Positive	
V.Sync Polarity	Positive		Positive		Negative		Negative		Positive	
	Separate		Composit		Separate		Sync on G		Separate	

TIMING NAME	26 H.HOLD 2		27 EDID		28 1280*1024@74Hz					
Pixel Clock		189.000 [MHz]		84.500 [MHz]		135.000 [MHz]		[MHz]		[MHz]
H.Frequency		87.500 [kHz]		65.000 [kHz]		78.860 [kHz]		[kHz]		[kHz]
V.Frequency		70.000 [Hz]		80.65 [Hz]		74.120 [Hz]		[Hz]		[Hz]
H.Tortal Time (A)	2160 [dots]	11.429 [us]	1300 [dots]	15.38 [us]	1712 [dots]	12.680 [us]	[dots]	[us]	[dots]	[us]
H.Addr Time (D)	1600 [dots]	8.466 [us]	1024 [dots]	12.12 [us]	1280 [dots]	9.480 [us]	[dots]	[us]	[dots]	[us]
H.Blank Time	560 [dots]	2.963 [us]	276 [dots]	3.26 [us]	432 [dots]	3.200 [us]	[dots]	[us]	[dots]	[us]
H.Front Porch (E)	64 [dots]	0.339 [us]	24 [dots]	0.28 [us]	32 [dots]	0.230 [us]	[dots]	[us]	[dots]	[us]
H.Sync Time (B)	192 [dots]	1.016 [us]	92 [dots]	1.09 [us]	144 [dots]	1.070 [us]	[dots]	[us]	[dots]	[us]
H.Back Porch (C)	304 [dots]	1.608 [us]	160 [dots]	1.89 [us]	256 [dots]	1.900 [us]	[dots]	[us]	[dots]	[us]
V.Tortal Time (O)	1250 [lines]	14.286 [ms]	806 [lines]	12.4 [ms]	1064 [lines]	13.491 [ms]	[lines]	[ms]	[lines]	[ms]
V.Addr Time (R)	1200 [lines]	13.714 [ms]	596 [lines]	9.169 [ms]	1024 [lines]	12.984 [ms]	[lines]	[ms]	[lines]	[ms]
V.Blank Time	50 [lines]	0.571 [ms]	210 [lines]	3.231 [ms]	40 [lines]	0.507 [ms]	[lines]	[ms]	[lines]	[ms]
V.Front Porch (S)	1 [lines]	0.011 [ms]	89 [lines]	1.343 [ms]	11 [lines]	0.139 [ms]	[lines]	[ms]	[lines]	[ms]
V.Sync Time (P)	3 [lines]	0.034 [ms]	6 [lines]	0.092 [ms]	3 [lines]	0.038 [ms]	[lines]	[ms]	[lines]	[ms]
V.Back Porch (Q)	46 [lines]	0.526 [ms]	115 [lines]	1.796 [ms]	26 [lines]	0.330 [ms]	[lines]	[ms]	[lines]	[ms]
Scan Type	Non-Interlaced		Non-Interlaced		Non-Interlaced					
H.Sync Polarity	Positive		Negative		Negative					
V.Sync Polarity	Positive		Negative		Negative					
	Separate		Separate							

Adjustment / Inspection Signal (SPECIAL)

NOTE) Use special signals when original signals can not be made by equipped signal generator.
Don't use these signal timing for Forcus Adjustment. (The resolution is different.)

			ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL
	PROGRAM NO.		16	16	17	17	18	18	19	19
	SIGNAL NAME		1280*1024 @60	-	MAC II 1152*870	-	1024*768 @85	-	1280*1024 @70	-
	RESOLUTION		1280*1024	-	1152*870	-	1024*768	-	1280*1024	-
	DOT CLOCK	(MHz)	108	**81**	100	**75**	94.5	**70.88**	127	**63.5**
	fh	(kHz)	63.98	63.98	68.681	68.681	68.68	68.68	74.882	74.882
	fv	(Hz)	60.02	60.02	75.062	75.062	85	85	69.853	69.853
HORIZONTAL	CELL SIZE	(DOT)	8	8	8	8	8	8	8	8
	TOTAL	(DOT)	1688	**1266**	1456	**1092**	1376	**1032**	1696	**848**
		(CHR)	211	**158**			172	**129**	212	**106**
		(uS)	15.63	15.63	14.56	14.56	14.56	14.56	13.354	13.354
	DISP	(DOT)	1280	**960**	1152	**864**	1024	**768**	1280	**640**
		(CHR)	160	**120**			128	**96**	160	**80**
		(uS)	11.85	11.85	11.52	11.52	10.84	10.84	10.079	10.079
	FRONT	(DOT)	48	**36**	32	**24**	48	**36**	32	**16**
		(uS)	0.44	0.44	0.32	0.32	0.51	0.51	0.252	0.252
	SYNC PULSE	(DOT)	112	**84**	128	**96**	96	**72**	160	**80**
		(uS)	1.04	1.04	1.28	1.28	1.02	1.02	1.26	1.26
	BACK	(DOT)	248	**186**	144	**108**	208	**156**	224	**112**
		(uS)	2.3	2.3	1.44	1.44	2.2	2.2	1.764	1.764

			ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL
	PROGRAM NO.		20	20	21	21	26	26	28	28
	SIGNAL NAME		1280*1024 @75	-	1600*1200 @75	-	H.HOLD2	-	1280*1024 @74	-
	RESOLUTION		1280*1024	-	1600*1200	-	1600*1200	-	1280*1024	-
	DOT CLOCK	(MHz)	135	**67.5**	202.5	**50.63**	203.046	**50.76**	135	**67.5**
	fh	(kHz)	79.975	79.975	93.75	93.75	94	94	78.86	78.86
	fv	(Hz)	75.025	75.025	75	75	75.199	75.199	74.12	74.12
HORIZONTAL	CELL SIZE	(DOT)	8	8	8	8	8	8	8	8
	TOTAL	(DOT)	1688	**844**	2160	**540**	2160	**540**	1712	**856**
		(CHR)	211	**158**	211	**53**	211	**53**		
		(uS)	12.504	12.504	10.667	10.667	10.638	10.638	12.68	12.68
	DISP	(DOT)	1280	**640**	1600	**400**	1600	**400**	1280	**640**
		(CHR)	160	**80**	200	**50**	200	**50**		
		(uS)	9.481	9.481	7.901	7.901	7.88	7.88	9.48	9.48
	FRONT	(DOT)	16	**8**	64	**16**	64	**16**	32	**16**
		(uS)	0.119	0.119	0.316	0.316	0.315	0.315	0.23	0.23
	SYNC PULSE	(DOT)	144	**72**	192	**48**	192	**48**	144	**72**
		(uS)	1.067	1.067	0.948	0.948	0.946	0.946	1.07	1.07
	BACK	(DOT)	248	**124**	304	**76**	304	**76**	256	**128**
		(uS)	1.837	1.837	1.501	1.501	1.497	1.497	1.9	1.9

3. Position of Connector / Test point of Adjustment

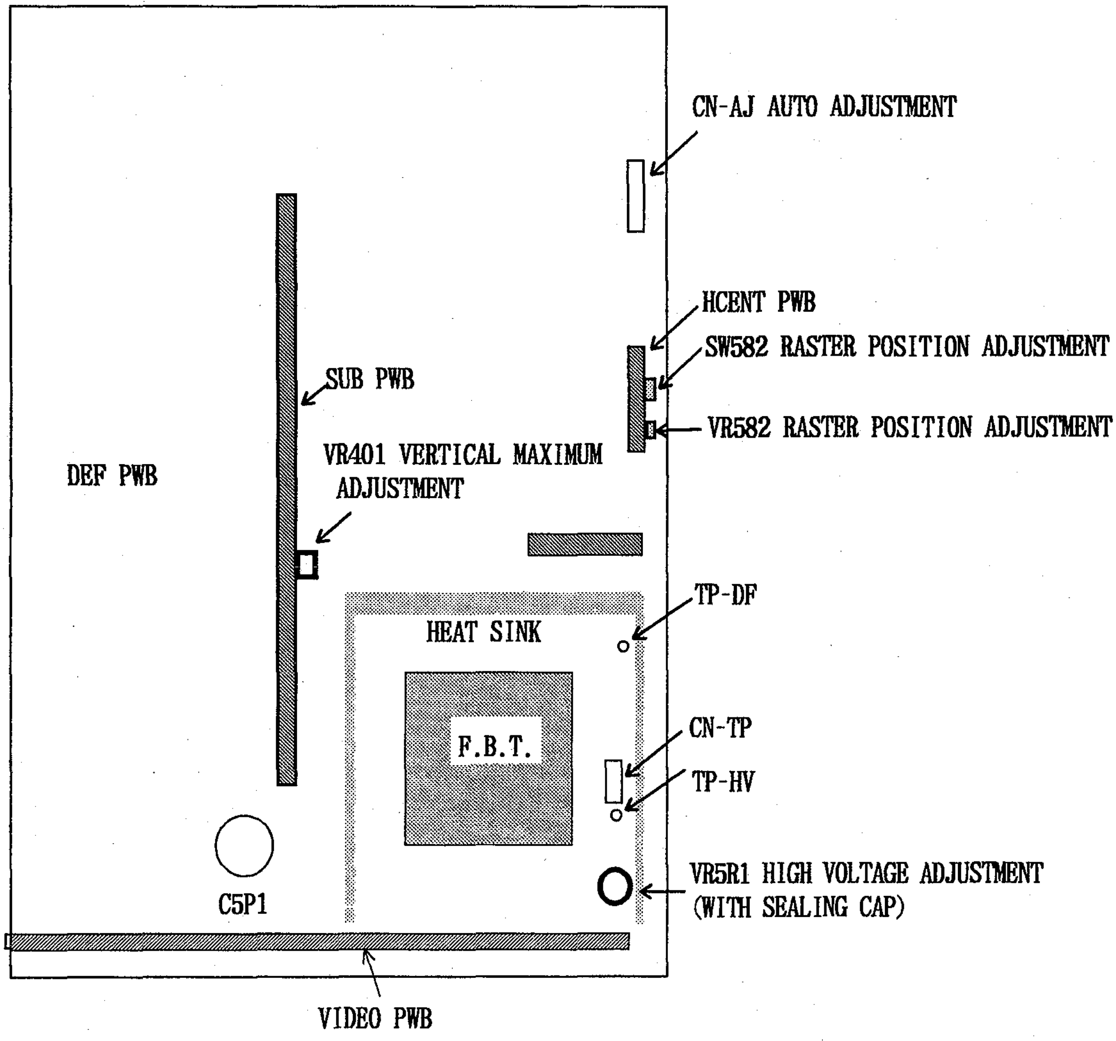

CN-AJ AUTO ADJUSTMENT
HCENT PWB
SW582 RASTER POSITION ADJUSTMENT
SUB PWB
VR582 RASTER POSITION ADJUSTMENT
VR401 VERTICAL MAXIMUM ADJUSTMENT
DEF PWB
TP-DF
HEAT SINK
CN-TP
F.B.T.
TP-HV
VR5R1 HIGH VOLTAGE ADJUSTMENT (WITH SEALING CAP)
C5P1
VIDEO PWB

Fig 3-1 MAIN PWB (Parts Side)

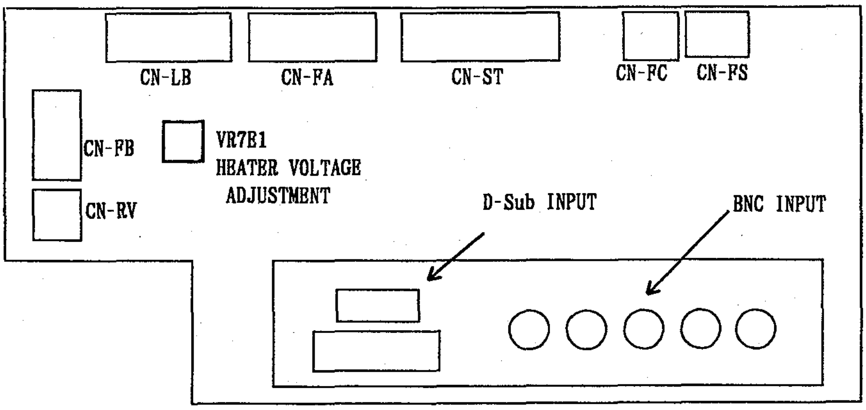

CN-LB
CN-FA
CN-ST
CN-FC
CN-FS
CN-FB
VR7B1 HEATER VOLTAGE ADJUSTMENT
CN-RV
D-Sub INPUT
BNC INPUT

Fig 3-2 VIDEO PWB (Parts Side)

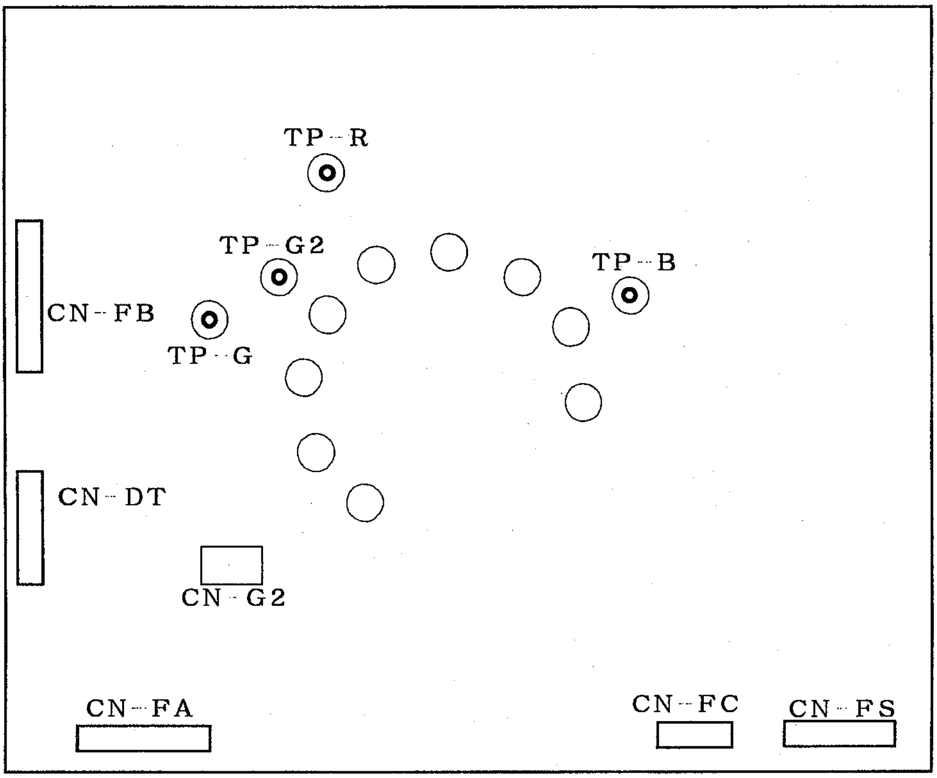

TP-R
TP-G2
TP-B
CN-FB
TP-G
CN-DT
CN-G2
CN-FA
CN-FC
CN-FS

Fig 3-3 CRT PWB (Solder Side)

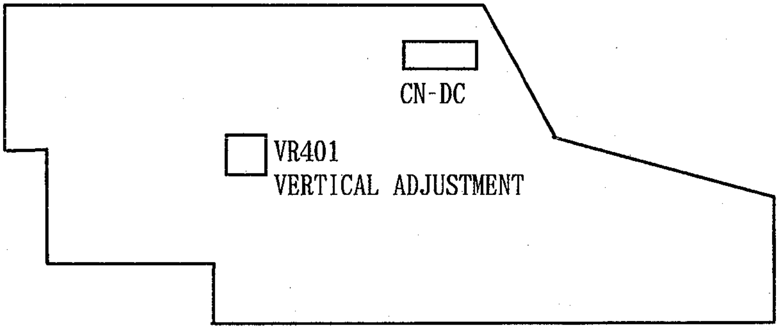

CN-DC
VR401
VERTICAL ADJUSTMENT

Fig 3-4 OSC PWB (Parts Side)

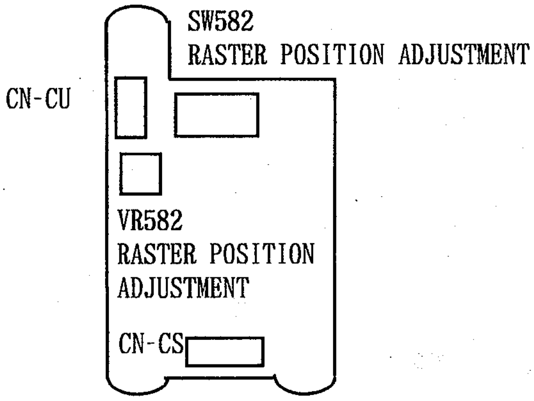

SW582
RASTER POSITION ADJUSTMENT
CN-CU
VR582
RASTER POSITION
ADJUSTMENT
CN-CS

Fig 3-5 HCENT PWB (Parts Side)

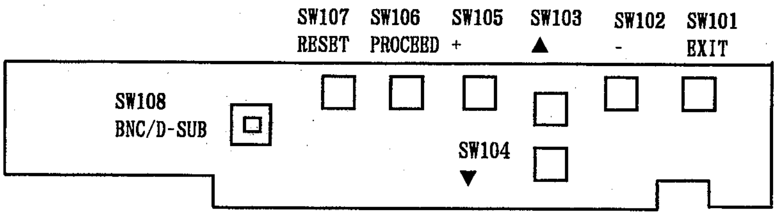

SW107
RESET
SW106
PROCEED
SW105
+
SW103
▲
SW102
-
SW101
EXIT
SW108
BNC/D-SUB
SW104
▼

Fig 3-6 CONT PWB (Parts Side)

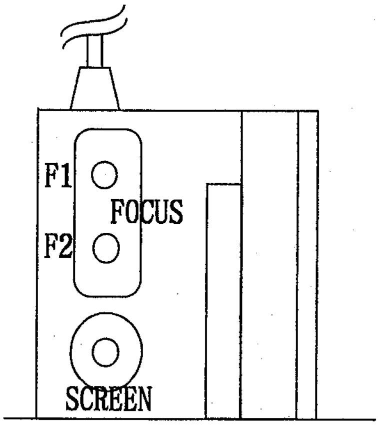

F1
FOCUS
F2
SCREEN

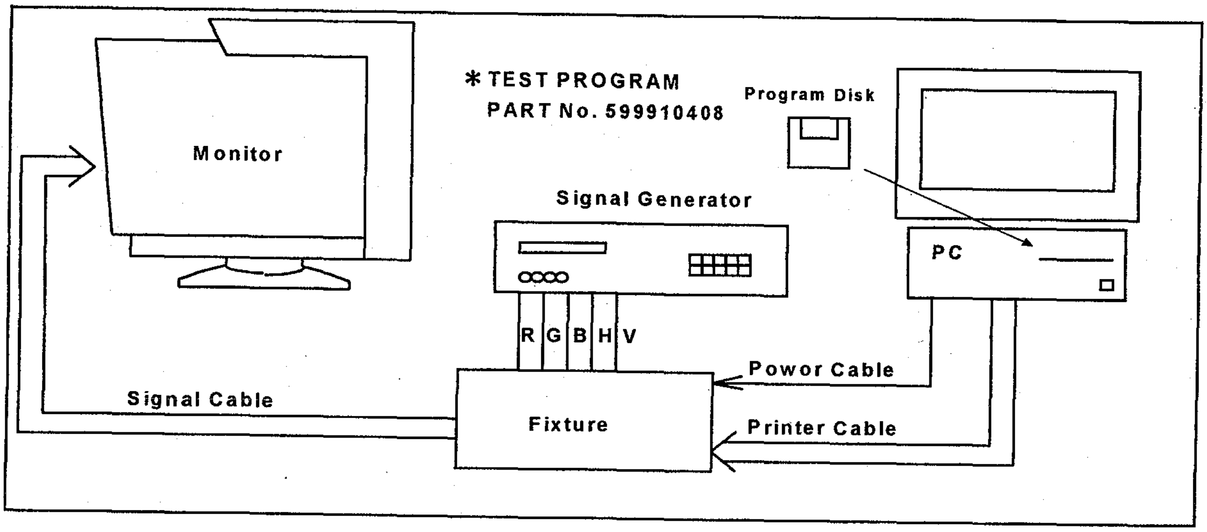
Fig 3-7 F. B. T. VR

STANDARD

1. .Inspection of PLUG & PLAY communication

1-1. A construction of System

This system should be connected as shown below.


Monitor
* TEST PROGRAM
PART No. 599910408
Program Disk
Signal Generator
PC
R
G
B
H
V
Powor Cable
Signal Cable
Fixture
Printer Cable

1-2. Starting method

1) Input Signal

Input signal must be separate sync. Two kinds of signals must be prepared.
One is the signal whose vertical synchronization frequency is 42Hz, and another is the signal whose vertical synchronization frequency is between 55Hz and 25kHz.
Horizontal synchronization frequency should be set to reasonable value(example 31.5kHz).

2) Power ON procedure

- First, put the floppy disk for PnP Inspection into PC and turn on PC.
- Turn on Fixture.
- Make sure that fixture's LED turns on and off.
- Turn on signal generator and monitor.

3) Starting PC Software

- Inspection of PnP communication
  To check the PnP communication, EDID file name is P1150, set "P P1150" to DOS command line and press return key.
- Writing EDID to EEPROM and inspection of PnP communication
  To write EDID to EEPROM and check the PnP communication which its EDID file name is P1150, type "WP P1150" on DOS prompt line and press return key.

1-3. Operation

- The operation should be performed according to the screen message.
- When the message of "Please set Vsync to 42Hz." is displayed, set the signal generator to the signal with vertical synchronization frequency of 42Hz. When the message of "Please set Vsync to over 55Hz." is displayed, set the signal generator to the signal whose vertical synchronization frequency is between 55Hz and 25kHz.
- The message of "Normally Complete" means that writing of EDID data or PnP inspection completed normally. The message of "Error" means that writing of EDID data or PnP inspection finished incorrectly.
- When the PnP inspection is completed, read EDID data would be displayed. And if the read EDID data differed from the original EDID data, the different bytes would be displayed in red.
- For the details of error, see the messages displayed at the bottom right of the screen. The meaning of the messages is shown on section 4.
- After writing of EDID data or inspection of DDC2B, monitor can not be communicated by DDC1. In that case, turn off and on the monitor again, which will make the DDC1 communication test possible.
- Make sure that fixture's LED flashes on and off before writing EDID data, inspecting DDC1 and DDC2B. If the fixture's LED does not flash on and off, turn off and turn on the monitor and the fixture.

1-4. Error Messages

- Start Bit Error
  This message is displayed when the start bit is not "H" while sending data from PC to MPU on the fixture. This error will be caused by noise etc. on the line.
- Command Error
  This message is displayed when the different command is sent from PC to MPU on the fixture.
- Hardware Error
  This message means that the PC does not recognize ACK command sent from the MPU on the fixture.
- File Open Error
  This message means that the input EDID file name was wrong.
- Command line Switch Error
  This message means that the input communication command is incorrect.
- Parity Error
  This message is displayed when the MPU on the fixture recognized the parity bit is incorrect. This error can be caused by noise etc. on the line.
- EDID Data Error
  This message is displayed when the null bit is not detected in EDID data read by DDC1 communication.
- EDID Data Sort Error
  This message is displayed when the header code is not detected in EDID data read by DDC1 communication.
- Time Out Error
  This message is displayed when the PC does not recognize ACK commands sent from MPU within 10 msec after the PC had sent communication command or EDID data. If this error occurs, check the connection on PC, fixture and monitor.

1-5. EDID data file

The EDID data file text is shown below. When you write or inspect EDID for this monitor, the following table can be used.

file name : P1150

EDID-048

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	38	A3	CA	53	01	01	01	01
10	25	06	01	01	0C	26	1D	78	E8	A0	B2	A2	54	4C	9B	26
20	10	48	4F	FF	FF	80	31	59	45	59	61	59	71	4F	81	59
30	81	99	A9	4F	01	01	1A	4F	40	30	62	B0	32	40	40	C0
40	13	00	80	20	11	00	00	1E	00	00	00	FD	00	37	A0	1F
50	5E	15	00	0A	20	20	20	20	20	20	00	00	00	FC	00	4E
60	45	43	20	50	31	31	35	30	0A	20	20	20	00	00	00	FF
70	00	36	38	30	30	30	30	31	4B	41	0A	20	20	20	00	EE

Table 1-5. Data list (Management number : EDID-048)

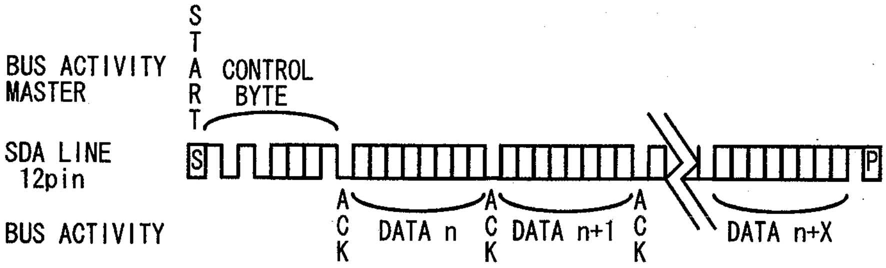

BUS ACTIVITY
MASTER
START
CONTROL
BYTE
SDA LINE
12pin
S
P
BUS ACTIVITY
ACK
DATA n
ACK
DATA n+1
ACK
DATA n+X

Diagram 1-5 Timing chart of DDC2B

2. CRT

[A] CRT face plate defect

1. Inspection condition

(1) In the operating condition, observe the defect on the screen under following condition :
9,300K (Δ x=0.281, Δ y=0.311)
white raster or the element monochrome raster which its brightness is 34cd/m^2 (10ft·L) on the screen center surrounding light is about 10 Lux

(2) In the non-operating condition, observe the defect of the screen under light of about 200 Lux.

(3) Inspection shall be made more than 60 cm away from the screen.

(4) Observe the screen on white raster and each monochrome color of red, green, and blue.

2. Division of zone

A screen is divided into following 2 zones.

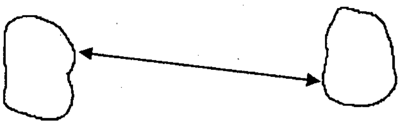
zone A : Area inside the rectangle that its size measures H : 358 mm, V : 268 mm in the center of screen.

zone B : Area outside the above rectangle

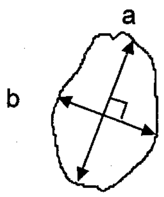
3. Limits

3-1. CRT face defect

3-1-1. Distance (most short distance)



3-1-2. Average diagram



Turn of $\frac{a+b}{2}$ or $\frac{a}{20}+2b$ small value into an on the average diameter. (a: length, b: width)

3-1-3. Limit

- Black spot, missing spot

Average diameter(mm)	A	B	A + B	minimum distance
0.51 ~	0	0	0	-
0.31 ~ 0.50	4	4	6	30 mm
0.15 ~ 0.30	6 (note 1)	6 (note 1)	10 (note 1)	10 mm

- Discoloration, stain

Average diameter(mm)	A	B	A + B	minimum distance
0.51 ~ 0.75	0	1	-	20 mm
0.15 ~ 0.50	2	3	-	10 mm

Note 1 : No missing spot larger than specified are allowed in Zone A.

Note 2 : The spec applies to each color.

3-2. Face plate defect

3-2-1. Bubble

Average diameter (mm) #1	Allowable number(pcs)			Minimum Separation (mm)
	Zone A	Zone B	Total	
0.76 ～	0	0	0	30
0.51 ～ 0.75	0	1	1	
0.26 ～ 0.50	2	3	5	
0.11 ～ 0.25	-	-	-	

#1:More than 5 detects shall not gather in a Φ 10 circle.

3-2-2. Scratch

Width(mm)	Allowable Length(mm)(Zone A + Zone B)
0.16 ～	rejected
0.11 ～ 0.15	13
0.06 ～ 0.11	26
～ 0.05	unlimited

3-2-3. Other glass defects

Flaw, crack and lack cannot be distinguish easily by naked eye.

Iron rust conforms to limited sample.

[B] K and TCO coating's surface defect

1. Inspection condition

(1) Put a valve on an inspective stand and Illuminate it from the top with white fluorescent light.

(2) Valve surface illuminance is less than 1500Lux and more than 1000Lux.

(3) Observe from distance of 40cm from surface, disregard flaws which can not be distinguished from this distance.

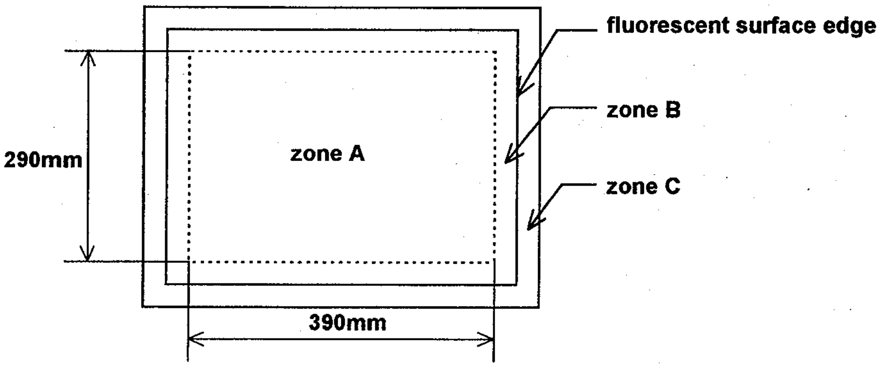
2. Division of zone

A screen is divided into following 3 zones.

zone A : Area inside the rectangle that measures H : 390 mm, V : 290 mm at the center of screen.

zone B : Area outside zone A and inside the fluorescent surface edge.

zone C : Area outside the fluorescent surface edge.



3. Limits

3-1. Scratch

Width(mm)	Allowable Length(mm)(Zone A + Zone B)
0.16 ～	reject
0.11 ～ 0.15	13
0.06 ～ 0.11	26
～ 0.05	unlimited

NOTE 1 : Even though width of scratch is more than 0.16mm, regard scratch whose contrast is weak extremely as stain and apply standard of 3.2.

NOTE 2 : Do not recognize flaws which injures goods prices though it is not especially stipulated as for zone C.

3-2. Opaque flaws (ex. Stain) and coating peeling

Do not apply the following standard to zone C.

Classify flaws by contrast and judge it by size every the contrast.

Definition of a contrast

High contrast : The foreign substance which shuts off light from fluorescence surface

Middle contrast : A semitransparent foreign substance and stain (ex. coating material which has been changed)

Low contrast : stain and dust which do not reflect light from fluorescence surface and can be distinguished by its appearance

Standard

average diameter classified by a contrast NOTE 4 (mm)			Allowable number		Allowable Length (mm) NOTE 3
High contrast	Middle contrast	Low contrast	zone A	zone B	
～ 0.10	～ 0.20	～ 0.50	Rejected	Rejected	-
0.11 ～ 0.25	0.21 ～ 0.50	0.51 ～ 1.25	2 [4]	4 [4]	20
0.26 ～ 0.50	0.51 ～ 1.00	1.26 ～ 2.50	1 [3]	2 [3]	40
0.51 ～ 0.75	1.01 ～ 1.50	2.51 ～ 3.75	0 [3]	1 [3]	80

NOTE 1 : A number inside brackets show allowable number of Low contrast. However, it is based on the following tables as for the total number of a low contrastive fault.

NOTE 2 : If a defect has different contrast's one in it, shall be judged by higher contrast's specification.

NOTE 3 : Allowable length between the different class is applied on size standard.

NOTE 4 : Convert (a+b)/2 or a/20 + 2b small value into average diameter. (a: length, b: width)

total number of a low contrast flaws	zone A	zone B
Standard classified by zones	5	6
Total (zone A + zone B)	8	8

3-3. Reflective rate : ≦ 2.0 % (at screen center · bottom wave length)

Bottom wave length : 440 ~ 620 nm (at screen center)

3-4. Reflected color unevenness

The reflected color unevenness which can be confirmed easily in visual check must not exist.

3-5. Intensity

Abrasive intensity : It must not peel when rubbed with #50 eraser for 30th time. (Pressure : 500 g)
Pencil intensity : It must not peel with 7H pencil. (It is based on JIS-5400.) [K coating's CRT]
: It must not peel with 3H pencil. (It is based on JIS-5400.) [TCO coating's CRT]

3-6. Stain, blur, unevenness, and other faults

The flaws must not be to be distinguishable in white raster or green raster.

4. Notice for K coating CRT cleaning

4-1. Do not rub CRT surface with hard objects or hit CRT surface.

4-2. Wipe dirt off lightly with dried soft cloth.
Do not use acid cleaner, alkaline cleaner, and solvent thinner.
Use water, alcohol, neutral glass cleaner or detergent when stain cannot be removed with drying cloth.
It salt stain stick to CRT surface, be quick to take out the stain from CRT.

TROUBLE SHOOTING

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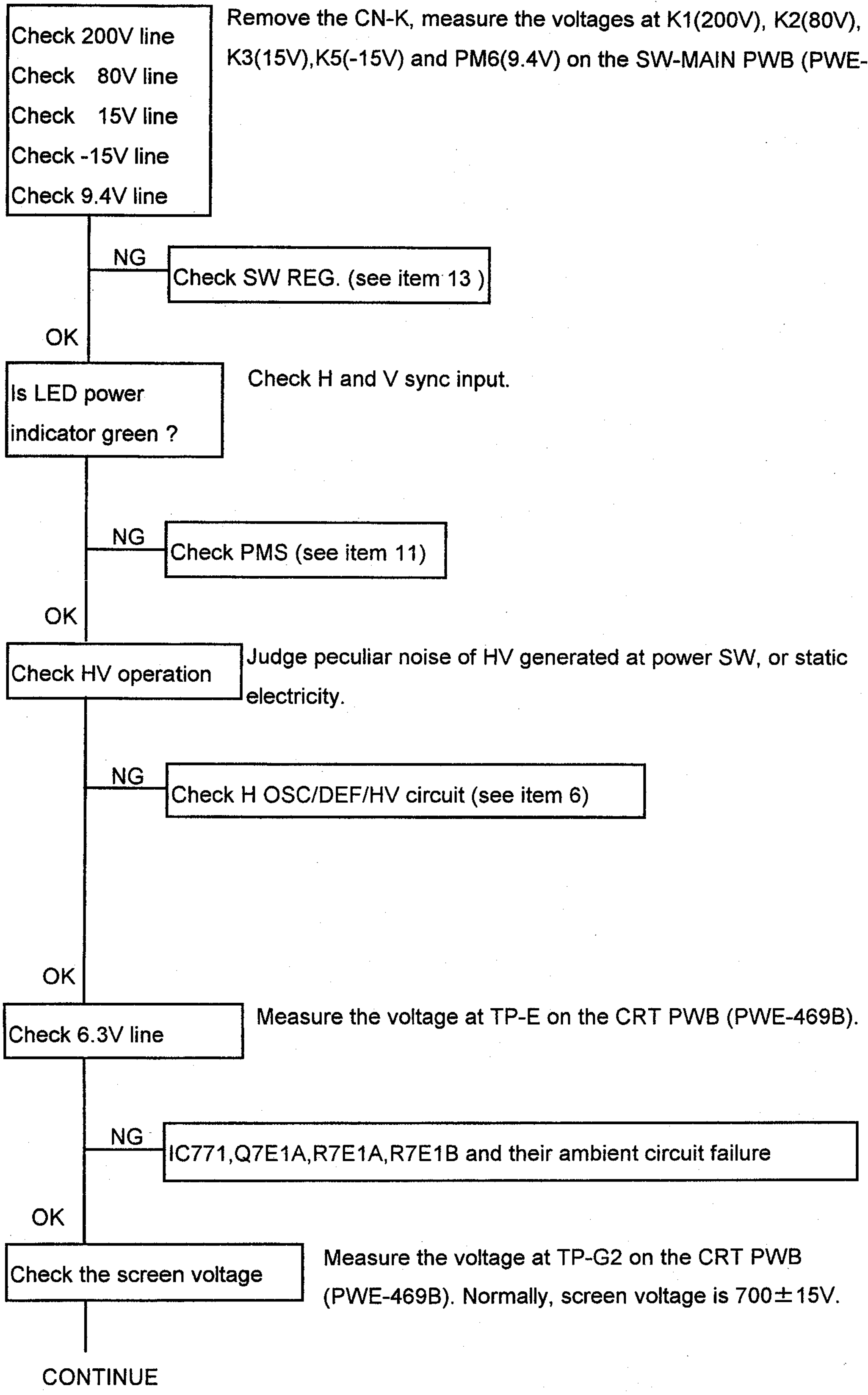
1. NO RASTER


Check 200V line
Check 80V line
Check 15V line
Check -15V line
Check 9.4V line
NG
Check SW REG. (see item 13)
OK
Is LED power indicator green ?
NG
Check PMS (see item 11)
OK
Check HV operation
NG
Check H OSC/DEF/HV circuit (see item 6)
OK
Check 6.3V line
NG
IC771,Q7E1A,R7E1A,R7E1B and their ambient circuit failure
OK
Check the screen voltage
CONTINUE

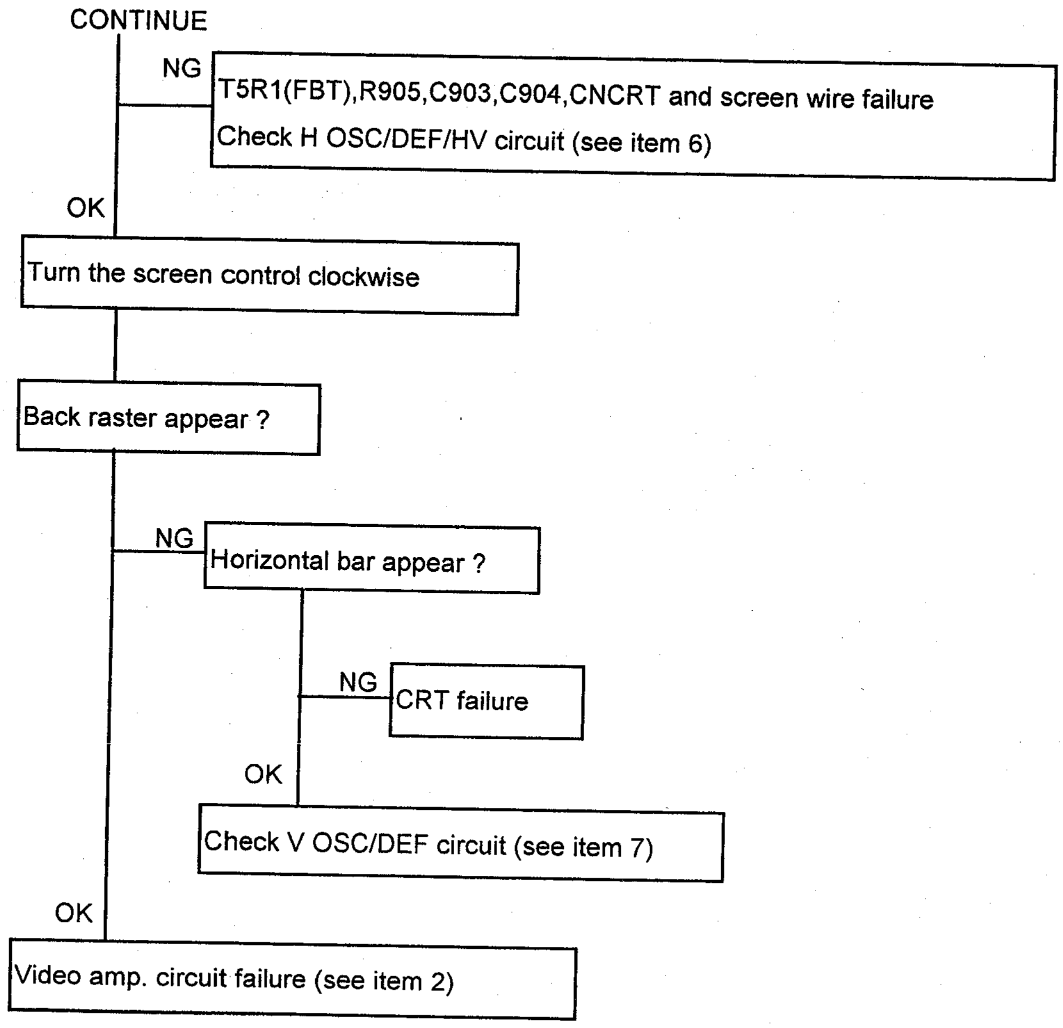
Remove the CN-K, measure the voltages at K1(200V), K2(80V), K3(15V),K5(-15V) and PM6(9.4V) on the SW-MAIN PWB (PWE-479A).

Check H and V sync input.

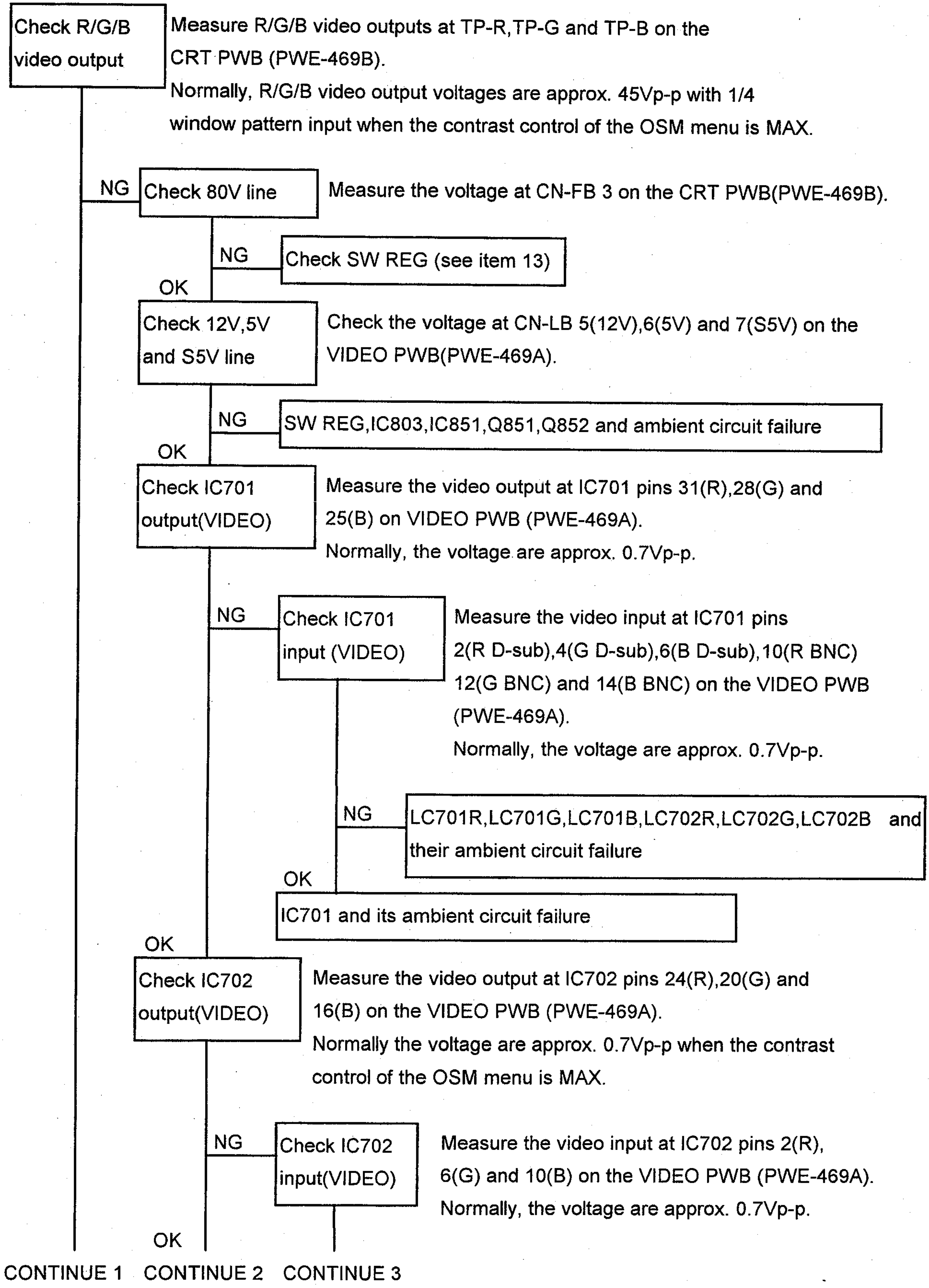
Judge peculiar noise of HV generated at power SW, or static electricity.

Measure the voltage at TP-E on the CRT PWB (PWE-469B).

Measure the voltage at TP-G2 on the CRT PWB (PWE-469B). Normally, screen voltage is 700±15V.


CONTINUE
NG
T5R1(FBT),R905,C903,C904,CNCRT and screen wire failure
Check H OSC/DEF/HV circuit (see item 6)
OK
Turn the screen control clockwise
Back raster appear ?
NG
Horizontal bar appear ?
NG
CRT failure
OK
Check V OSC/DEF circuit (see item 7)
OK
Video amp. circuit failure (see item 2)

2. ABNORMAL VIDEO ON CRT SCREEN (too dark or too bright)



Check R/G/B video output

Measure R/G/B video outputs at TP-R,TP-G and TP-B on the CRT PWB (PWE-469B).
Normally, R/G/B video output voltages are approx. 45Vp-p with 1/4 window pattern input when the contrast control of the OSM menu is MAX.

NG

Check 80V line

Measure the voltage at CN-FB 3 on the CRT PWB(PWE-469B).

NG

Check SW REG (see item 13)

OK

Check 12V,5V and S5V line

Check the voltage at CN-LB 5(12V),6(5V) and 7(S5V) on the VIDEO PWB(PWE-469A).

NG

SW REG,IC803,IC851,Q851,Q852 and ambient circuit failure

OK

Check IC701 output(VIDEO)

Measure the video output at IC701 pins 31(R),28(G) and 25(B) on VIDEO PWB (PWE-469A).
Normally, the voltage are approx. 0.7Vp-p.

NG

Check IC701 input (VIDEO)

Measure the video input at IC701 pins 2(R D-sub),4(G D-sub),6(B D-sub),10(R BNC) 12(G BNC) and 14(B BNC) on the VIDEO PWB (PWE-469A).
Normally, the voltage are approx. 0.7Vp-p.

NG

LC701R,LC701G,LC701B,LC702R,LC702G,LC702B and their ambient circuit failure

OK

IC701 and its ambient circuit failure

OK

Check IC702 output(VIDEO)

Measure the video output at IC702 pins 24(R),20(G) and 16(B) on the VIDEO PWB (PWE-469A).
Normally the voltage are approx. 0.7Vp-p when the contrast control of the OSM menu is MAX.

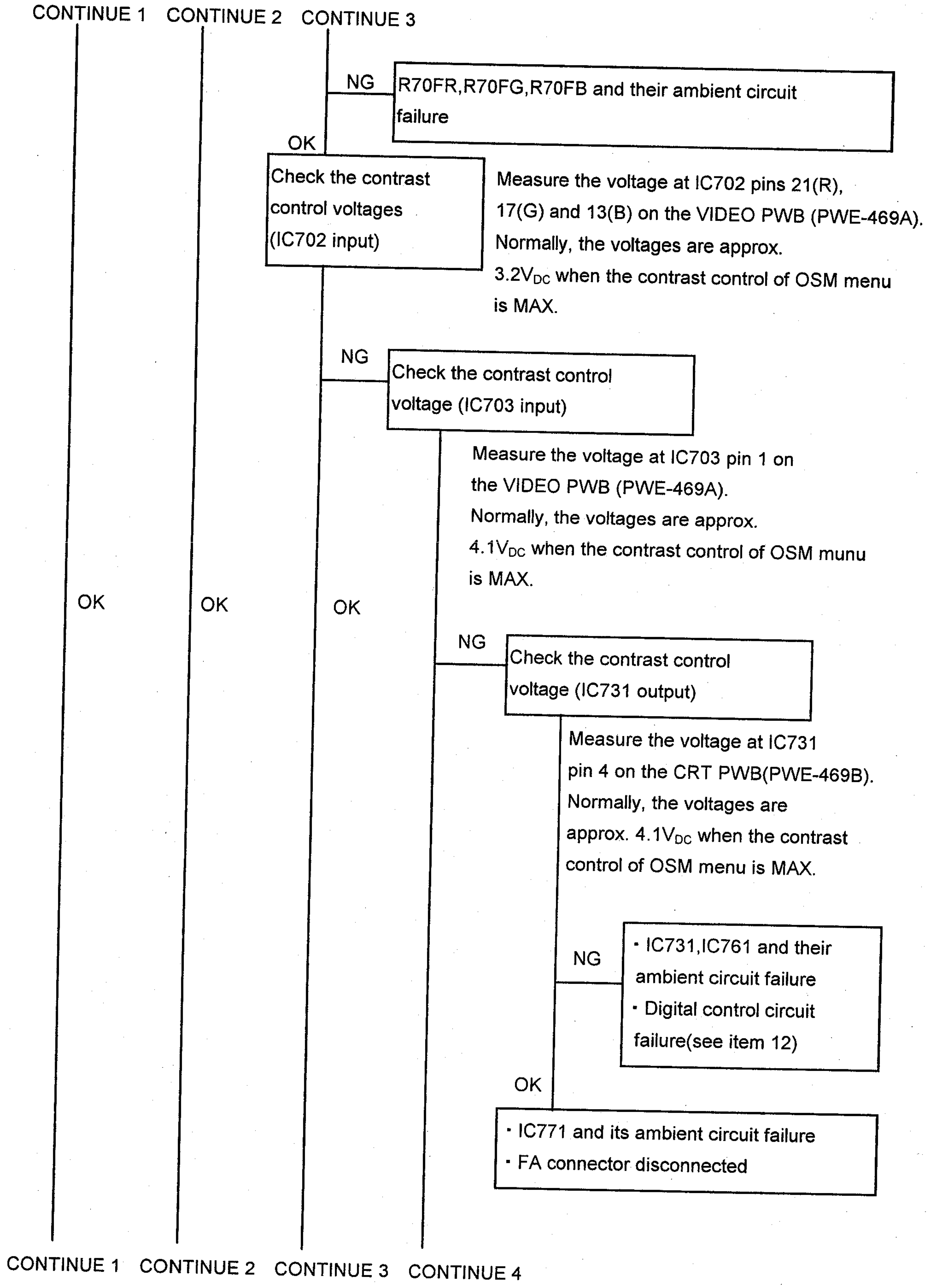
NG

Check IC702 input(VIDEO)

Measure the video input at IC702 pins 2(R), 6(G) and 10(B) on the VIDEO PWB (PWE-469A).
Normally, the voltage are approx. 0.7Vp-p.

OK

CONTINUE 1 CONTINUE 2 CONTINUE 3


CONTINUE 1
CONTINUE 2
CONTINUE 3
NG
OK
NG
OK
OK
OK
NG
NG
OK
CONTINUE 1
CONTINUE 2
CONTINUE 3
CONTINUE 4

R70FR,R70FG,R70FB and their ambient circuit failure

Check the contrast control voltages (IC702 input)

Measure the voltage at IC702 pins 21(R), 17(G) and 13(B) on the VIDEO PWB (PWE-469A). Normally, the voltages are approx. 3.2V_{DC} when the contrast control of OSM menu is MAX.

Check the contrast control voltage (IC703 input)

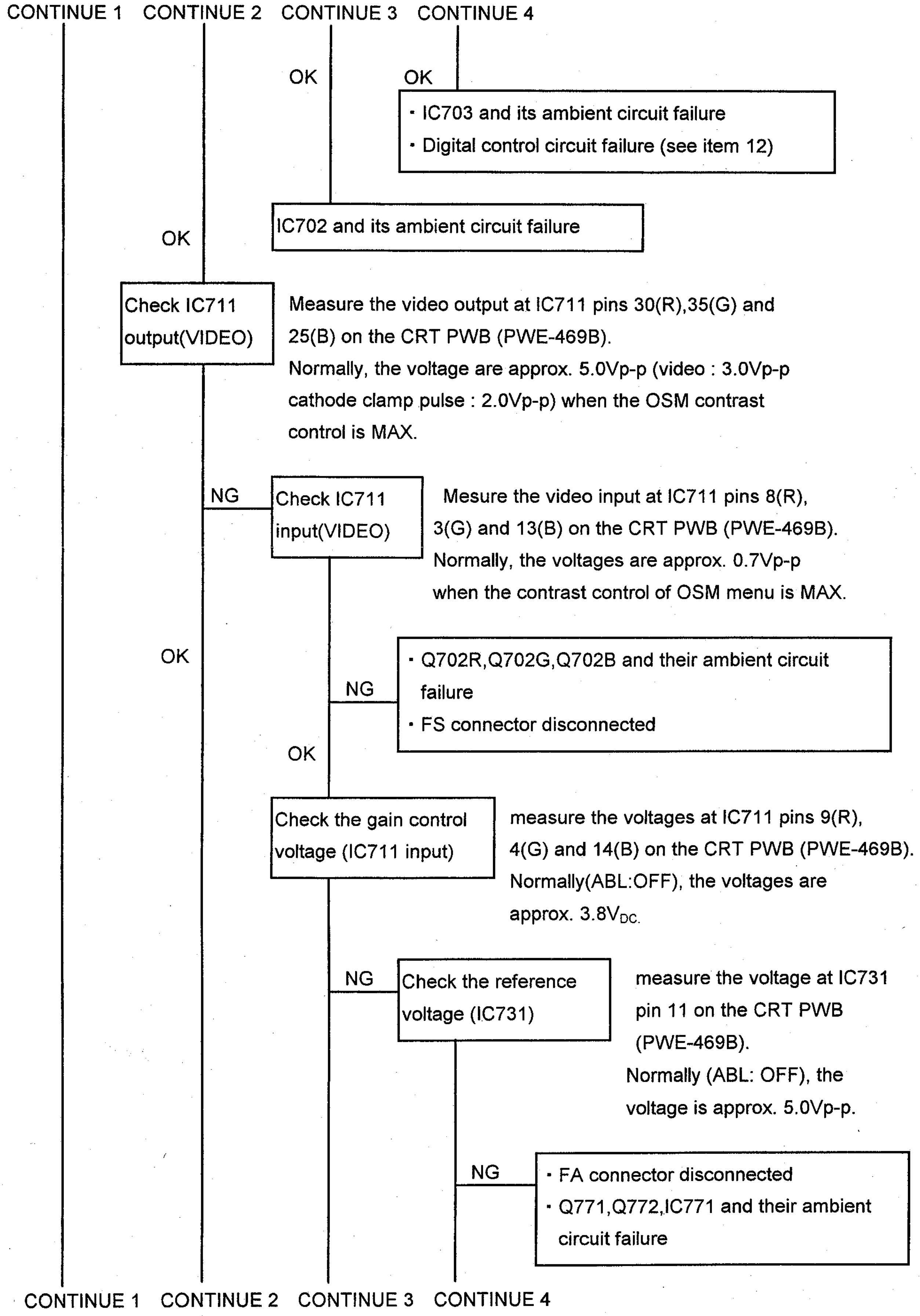
Measure the voltage at IC703 pin 1 on the VIDEO PWB (PWE-469A). Normally, the voltages are approx. 4.1V_{DC} when the contrast control of OSM munu is MAX.

Check the contrast control voltage (IC731 output)

Measure the voltage at IC731 pin 4 on the CRT PWB(PWE-469B). Normally, the voltages are approx. 4.1V_{DC} when the contrast control of OSM menu is MAX.

- IC731,IC761 and their ambient circuit failure
- Digital control circuit failure(see item 12)

- IC771 and its ambient circuit failure
- FA connector disconnected

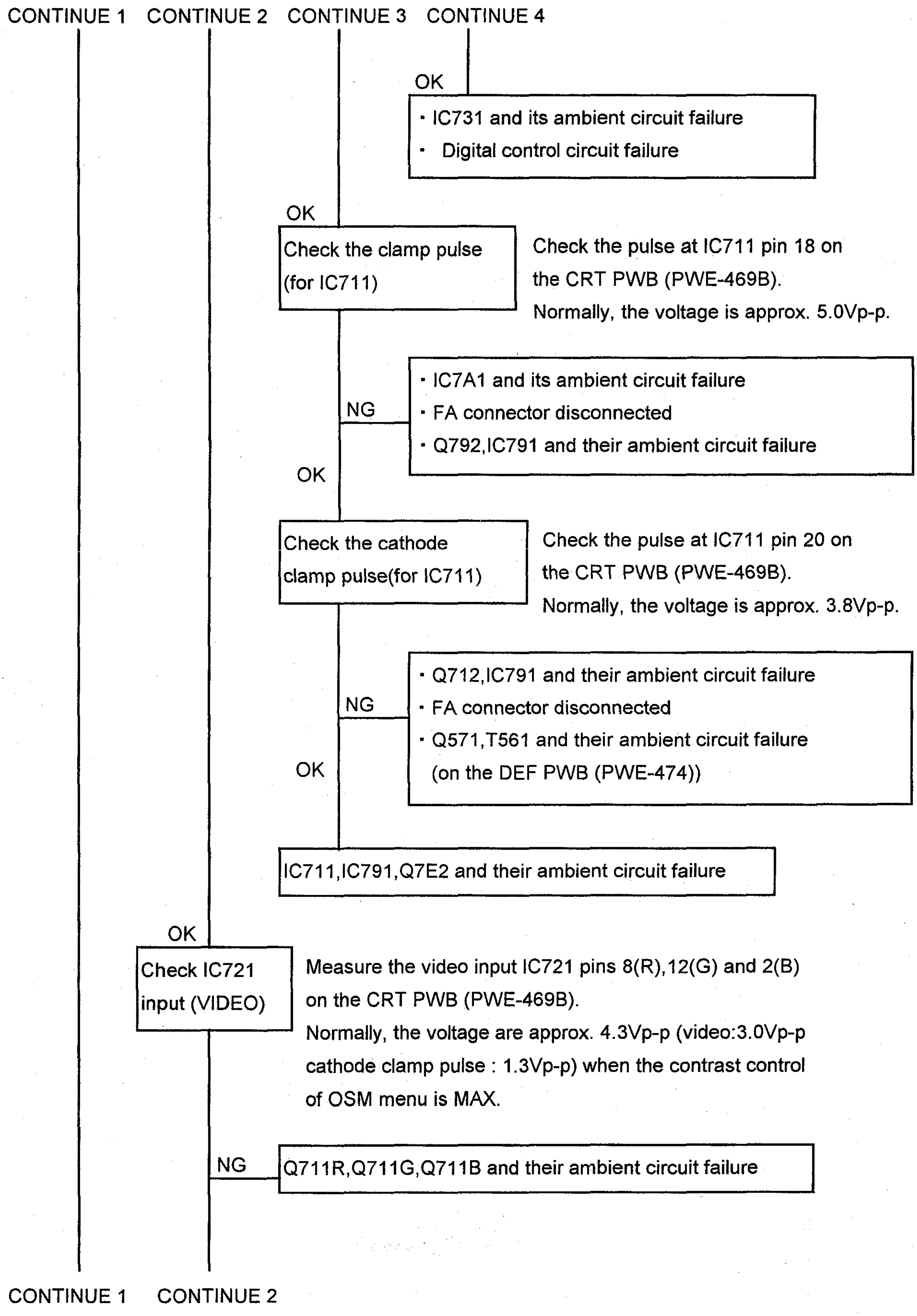

CONTINUE 1
CONTINUE 2
CONTINUE 3
CONTINUE 4
OK
OK
・IC703 and its ambient circuit failure
・Digital control circuit failure (see item 12)
OK
IC702 and its ambient circuit failure
Check IC711 output(VIDEO)
NG
Check IC711 input(VIDEO)
OK
NG
・Q702R,Q702G,Q702B and their ambient circuit failure
・FS connector disconnected
OK
Check the gain control voltage (IC711 input)
NG
Check the reference voltage (IC731)
NG
・FA connector disconnected
・Q771,Q772,IC771 and their ambient circuit failure
CONTINUE 1
CONTINUE 2
CONTINUE 3
CONTINUE 4

Measure the video output at IC711 pins 30(R),35(G) and 25(B) on the CRT PWB (PWE-469B).
Normally, the voltage are approx. 5.0Vp-p (video : 3.0Vp-p cathode clamp pulse : 2.0Vp-p) when the OSM contrast control is MAX.

Mesure the video input at IC711 pins 8(R), 3(G) and 13(B) on the CRT PWB (PWE-469B).
Normally, the voltages are approx. 0.7Vp-p when the contrast control of OSM menu is MAX.

measure the voltages at IC711 pins 9(R), 4(G) and 14(B) on the CRT PWB (PWE-469B).
Normally(ABL:OFF), the voltages are approx. 3.8V_{DC}.

measure the voltage at IC731 pin 11 on the CRT PWB (PWE-469B).
Normally (ABL: OFF), the voltage is approx. 5.0Vp-p.



- IC731 and its ambient circuit failure
- Digital control circuit failure

Check the clamp pulse (for IC711)

Check the pulse at IC711 pin 18 on the CRT PWB (PWE-469B).
Normally, the voltage is approx. 5.0Vp-p.

- IC7A1 and its ambient circuit failure
- FA connector disconnected
- Q792,IC791 and their ambient circuit failure

Check the cathode clamp pulse(for IC711)

Check the pulse at IC711 pin 20 on the CRT PWB (PWE-469B).
Normally, the voltage is approx. 3.8Vp-p.

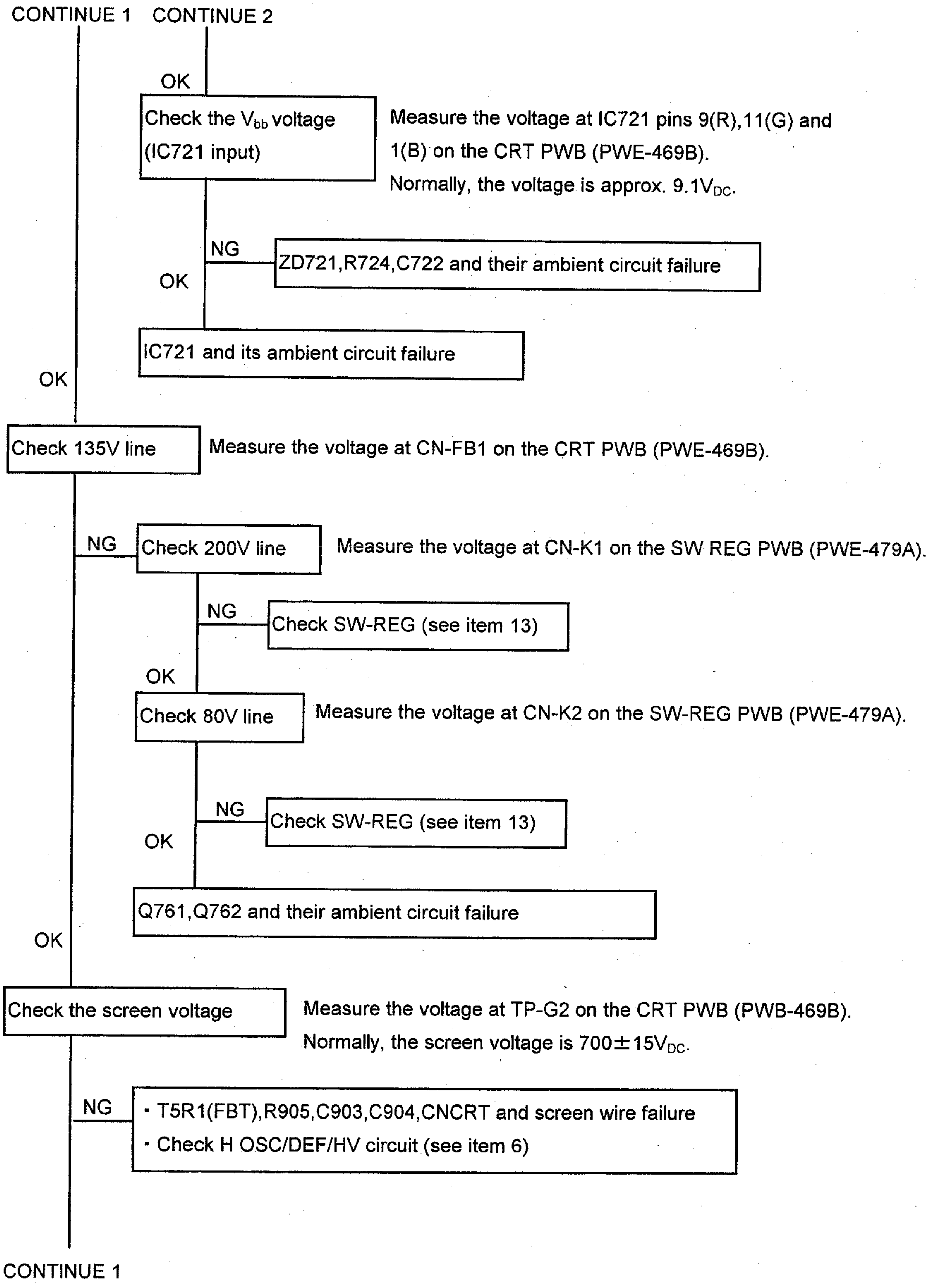
- Q712,IC791 and their ambient circuit failure
- FA connector disconnected
- Q571,T561 and their ambient circuit failure (on the DEF PWB (PWE-474))

IC711,IC791,Q7E2 and their ambient circuit failure

Check IC721 input (VIDEO)

Measure the video input IC721 pins 8(R),12(G) and 2(B) on the CRT PWB (PWE-469B).
Normally, the voltage are approx. 4.3Vp-p (video:3.0Vp-p cathode clamp pulse : 1.3Vp-p) when the contrast control of OSM menu is MAX.

Q711R,Q711G,Q711B and their ambient circuit failure


CONTINUE 1
CONTINUE 2
OK
Check the V_{bb} voltage (IC721 input)
NG
ZD721,R724,C722 and their ambient circuit failure
OK
IC721 and its ambient circuit failure
OK
Check 135V line
NG
Check 200V line
NG
Check SW-REG (see item 13)
OK
Check 80V line
NG
Check SW-REG (see item 13)
OK
Q761,Q762 and their ambient circuit failure
OK
Check the screen voltage
NG
・T5R1(FBT),R905,C903,C904,CNCRT and screen wire failure
・Check H OSC/DEF/HV circuit (see item 6)
CONTINUE 1

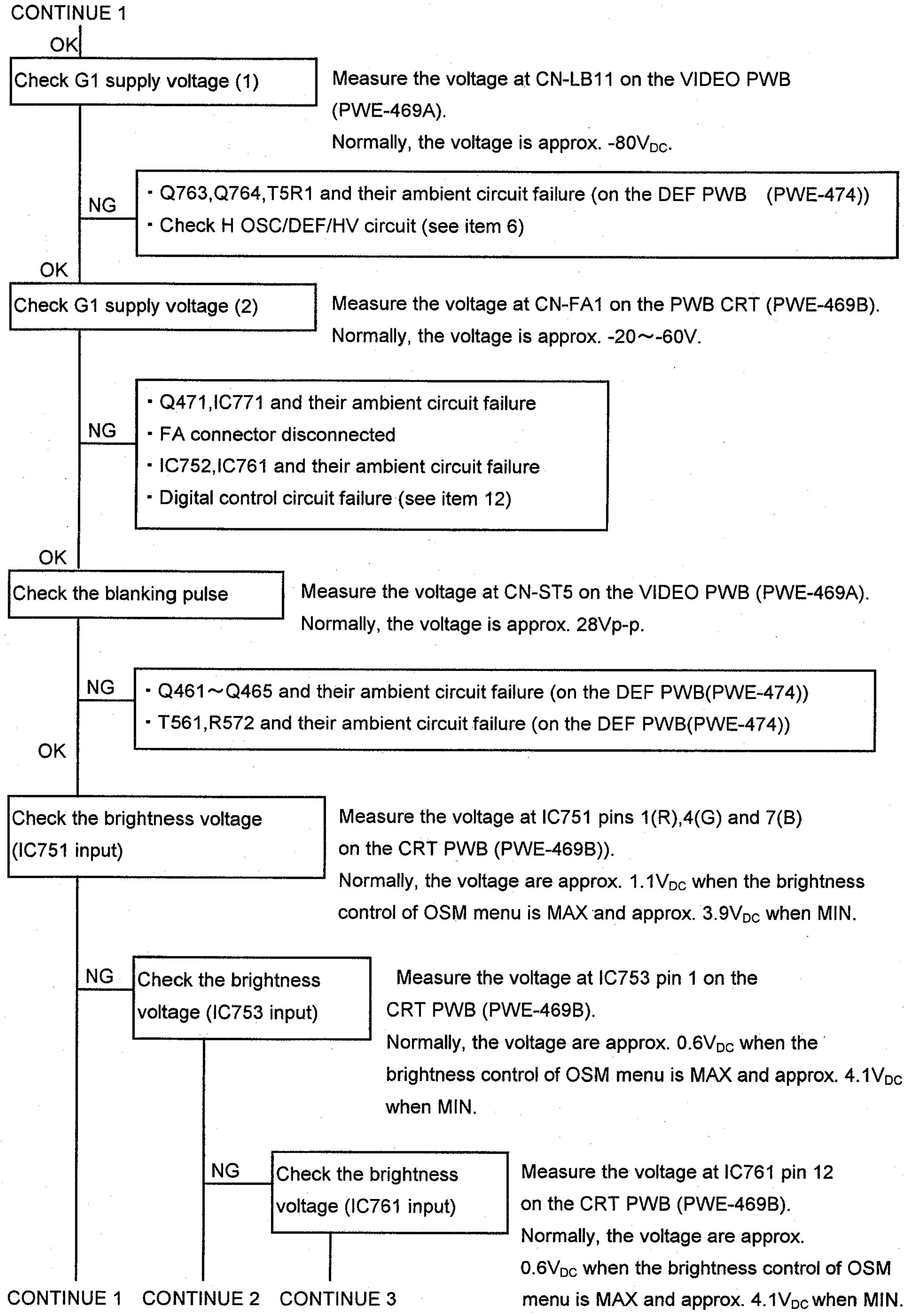
Measure the voltage at IC721 pins 9(R),11(G) and 1(B) on the CRT PWB (PWE-469B).
Normally, the voltage is approx. 9.1V_{DC}.

Measure the voltage at CN-FB1 on the CRT PWB (PWE-469B).

Measure the voltage at CN-K1 on the SW REG PWB (PWE-479A).

Measure the voltage at CN-K2 on the SW-REG PWB (PWE-479A).

Measure the voltage at TP-G2 on the CRT PWB (PWB-469B).
Normally, the screen voltage is 700±15V_{DC}.


CONTINUE 1
OK
Check G1 supply voltage (1)
NG
・Q763,Q764,T5R1 and their ambient circuit failure (on the DEF PWB (PWE-474))
・Check H OSC/DEF/HV circuit (see item 6)
OK
Check G1 supply voltage (2)
NG
・Q471,IC771 and their ambient circuit failure
・FA connector disconnected
・IC752,IC761 and their ambient circuit failure
・Digital control circuit failure (see item 12)
OK
Check the blanking pulse
NG
・Q461～Q465 and their ambient circuit failure (on the DEF PWB(PWE-474))
・T561,R572 and their ambient circuit failure (on the DEF PWB(PWE-474))
OK
Check the brightness voltage (IC751 input)
NG
Check the brightness voltage (IC753 input)
NG
Check the brightness voltage (IC761 input)
CONTINUE 1
CONTINUE 2
CONTINUE 3

Measure the voltage at CN-LB11 on the VIDEO PWB (PWE-469A).
Normally, the voltage is approx. -80V_{DC}.

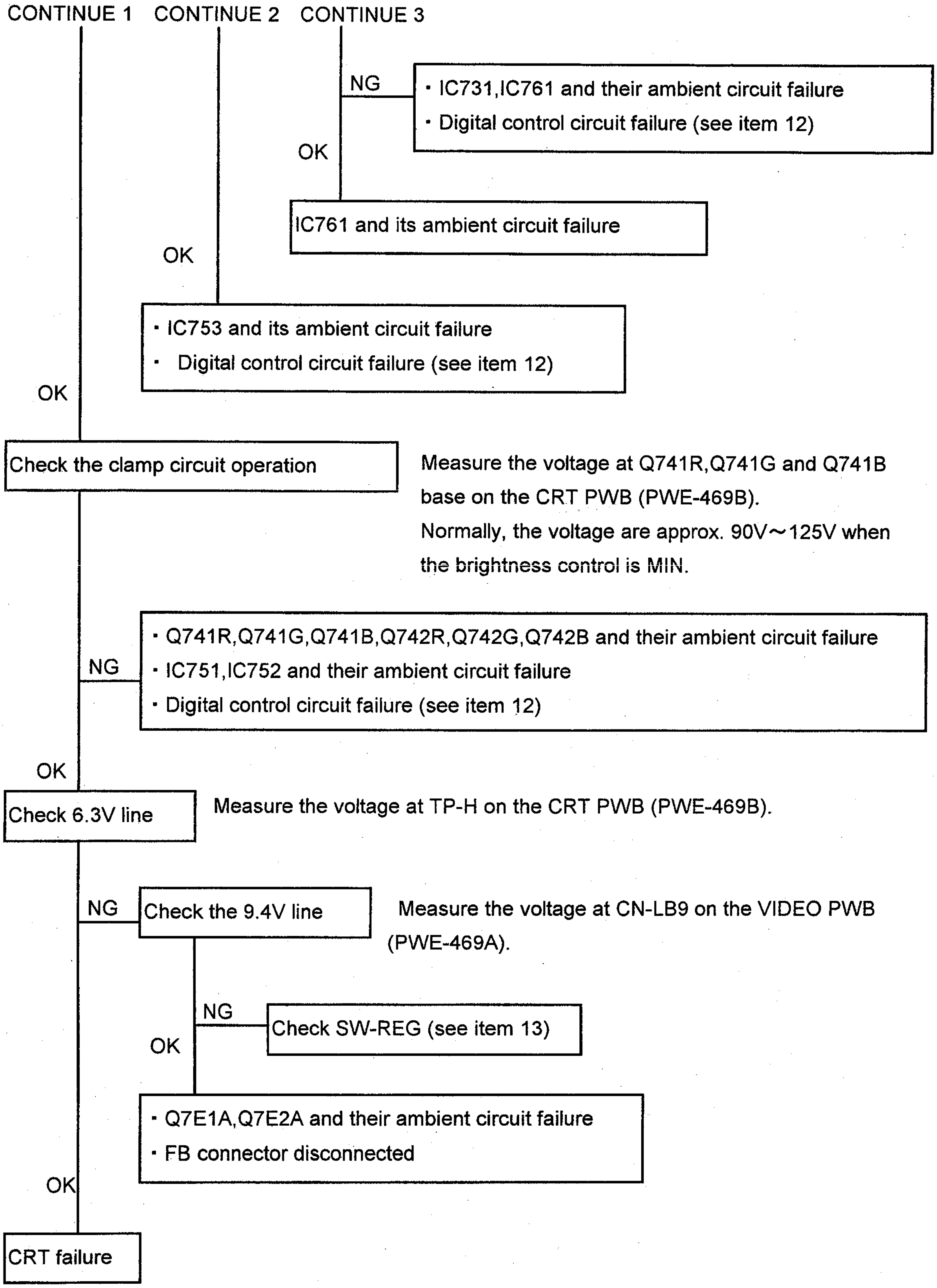
Measure the voltage at CN-FA1 on the PWB CRT (PWE-469B).
Normally, the voltage is approx. -20～-60V.

Measure the voltage at CN-ST5 on the VIDEO PWB (PWE-469A).
Normally, the voltage is approx. 28Vp-p.

Measure the voltage at IC751 pins 1(R),4(G) and 7(B) on the CRT PWB (PWE-469B)).
Normally, the voltage are approx. 1.1V_{DC} when the brightness control of OSM menu is MAX and approx. 3.9V_{DC} when MIN.

Measure the voltage at IC753 pin 1 on the CRT PWB (PWE-469B).
Normally, the voltage are approx. 0.6V_{DC} when the brightness control of OSM menu is MAX and approx. 4.1V_{DC} when MIN.

Measure the voltage at IC761 pin 12 on the CRT PWB (PWE-469B).
Normally, the voltage are approx. 0.6V_{DC} when the brightness control of OSM menu is MAX and approx. 4.1V_{DC} when MIN.



- IC731,IC761 and their ambient circuit failure
- Digital control circuit failure (see item 12)

IC761 and its ambient circuit failure

- IC753 and its ambient circuit failure
- Digital control circuit failure (see item 12)

Check the clamp circuit operation

Measure the voltage at Q741R,Q741G and Q741B base on the CRT PWB (PWE-469B). Normally, the voltage are approx. 90V～125V when the brightness control is MIN.

- Q741R,Q741G,Q741B,Q742R,Q742G,Q742B and their ambient circuit failure
- IC751,IC752 and their ambient circuit failure
- Digital control circuit failure (see item 12)

Check 6.3V line

Measure the voltage at TP-H on the CRT PWB (PWE-469B).

Check the 9.4V line

Measure the voltage at CN-LB9 on the VIDEO PWB (PWE-469A).

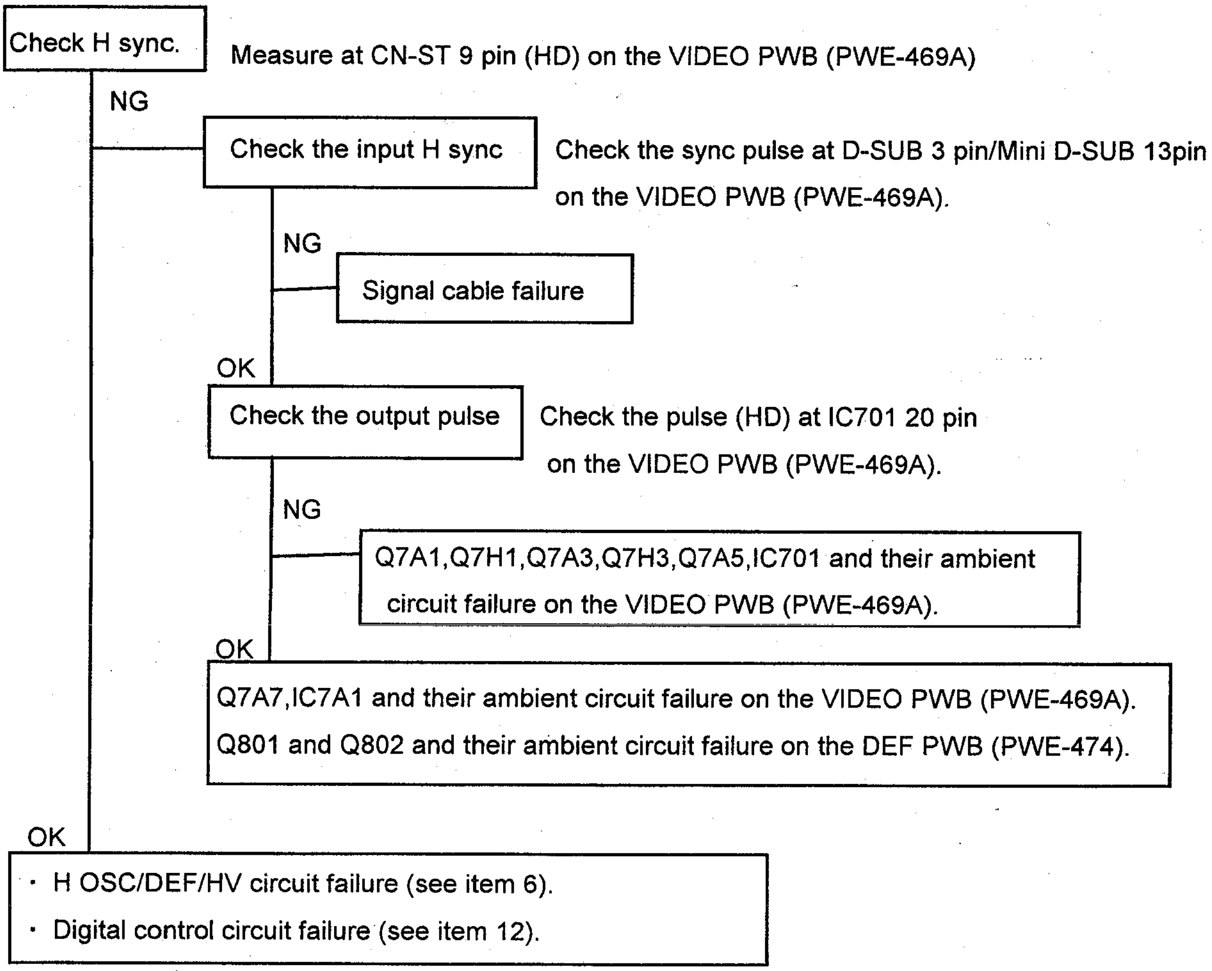
Check SW-REG (see item 13)

- Q7E1A,Q7E2A and their ambient circuit failure
- FB connector disconnected

CRT failure

3. UNSTABLE PICTURE

3-1. Horizontal


Check H sync.
NG
Check the input H sync
NG
Signal cable failure
OK
Check the output pulse
NG
OK
OK

Measure at CN-ST 9 pin (HD) on the VIDEO PWB (PWE-469A)

Check the sync pulse at D-SUB 3 pin/Mini D-SUB 13pin on the VIDEO PWB (PWE-469A).

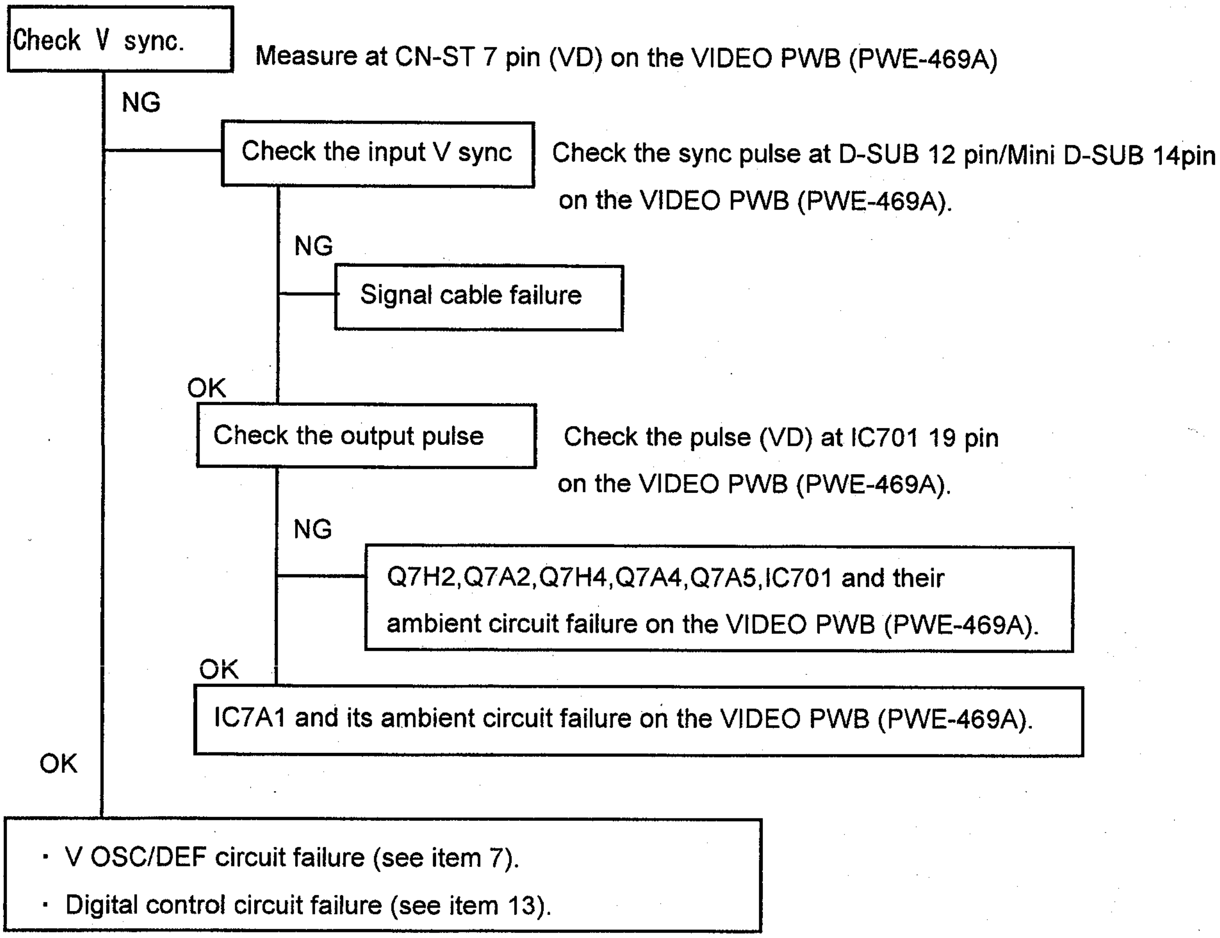
Check the pulse (HD) at IC701 20 pin on the VIDEO PWB (PWE-469A).

Q7A1,Q7H1,Q7A3,Q7H3,Q7A5,IC701 and their ambient circuit failure on the VIDEO PWB (PWE-469A).

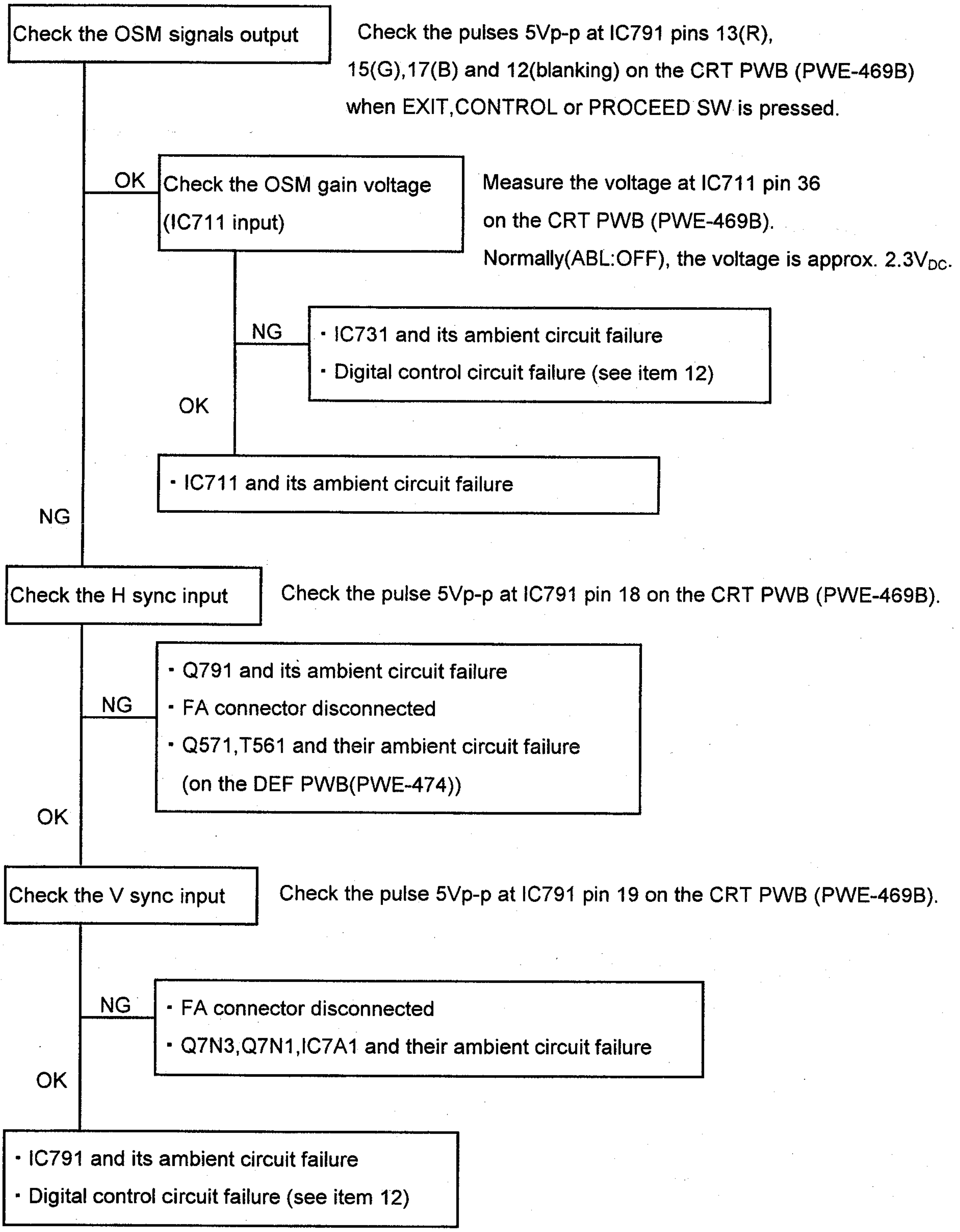
Q7A7,IC7A1 and their ambient circuit failure on the VIDEO PWB (PWE-469A).
Q801 and Q802 and their ambient circuit failure on the DEF PWB (PWE-474).

- H OSC/DEF/HV circuit failure (see item 6).
- Digital control circuit failure (see item 12).

3-2. Vertical


Check V sync.
Measure at CN-ST 7 pin (VD) on the VIDEO PWB (PWE-469A)
NG
Check the input V sync
Check the sync pulse at D-SUB 12 pin/Mini D-SUB 14pin on the VIDEO PWB (PWE-469A).
NG
Signal cable failure
OK
Check the output pulse
Check the pulse (VD) at IC701 19 pin on the VIDEO PWB (PWE-469A).
NG
Q7H2,Q7A2,Q7H4,Q7A4,Q7A5,IC701 and their ambient circuit failure on the VIDEO PWB (PWE-469A).
OK
IC7A1 and its ambient circuit failure on the VIDEO PWB (PWE-469A).
OK
・ V OSC/DEF circuit failure (see item 7).
・ Digital control circuit failure (see item 13).

4. ON SCREEN MANAGER (OSM) FAILURE


Check the OSM signals output
OK
Check the OSM gain voltage (IC711 input)
NG
• IC731 and its ambient circuit failure
• Digital control circuit failure (see item 12)
OK
• IC711 and its ambient circuit failure
NG
Check the H sync input
NG
• Q791 and its ambient circuit failure
• FA connector disconnected
• Q571,T561 and their ambient circuit failure (on the DEF PWB(PWE-474))
OK
Check the V sync input
NG
• FA connector disconnected
• Q7N3,Q7N1,IC7A1 and their ambient circuit failure
OK
• IC791 and its ambient circuit failure
• Digital control circuit failure (see item 12)

Check the pulses 5Vp-p at IC791 pins 13(R), 15(G),17(B) and 12(blanking) on the CRT PWB (PWE-469B) when EXIT,CONTROL or PROCEED SW is pressed.

Measure the voltage at IC711 pin 36 on the CRT PWB (PWE-469B). Normally(ABL:OFF), the voltage is approx. 2.3V_{DC}.

Check the pulse 5Vp-p at IC791 pin 18 on the CRT PWB (PWE-469B).

Check the pulse 5Vp-p at IC791 pin 19 on the CRT PWB (PWE-469B).

5. ABNORMAL PICTURE

5-1. Horizontal Size

Check HV voltage — Measure the voltage at CRT anode. Normally, the voltage is approx. 27KV.

NG → HV circuit failure (see item 6)

OK

Check 9.4V line — Check the voltage at CN-PM pin 6 on the DEF PWB (PWE-474).

NG → SW REG. failure (see item 13)

OK

Check the voltage which is supplied to CPU

NG → IC801, IC802, IC803, IC701, IC7A1 and their ambient circuit failure

OK

Check the horizontal frequency mode output (IC801 pins 35~42)
See Fig 5.1.1

CONTINUE

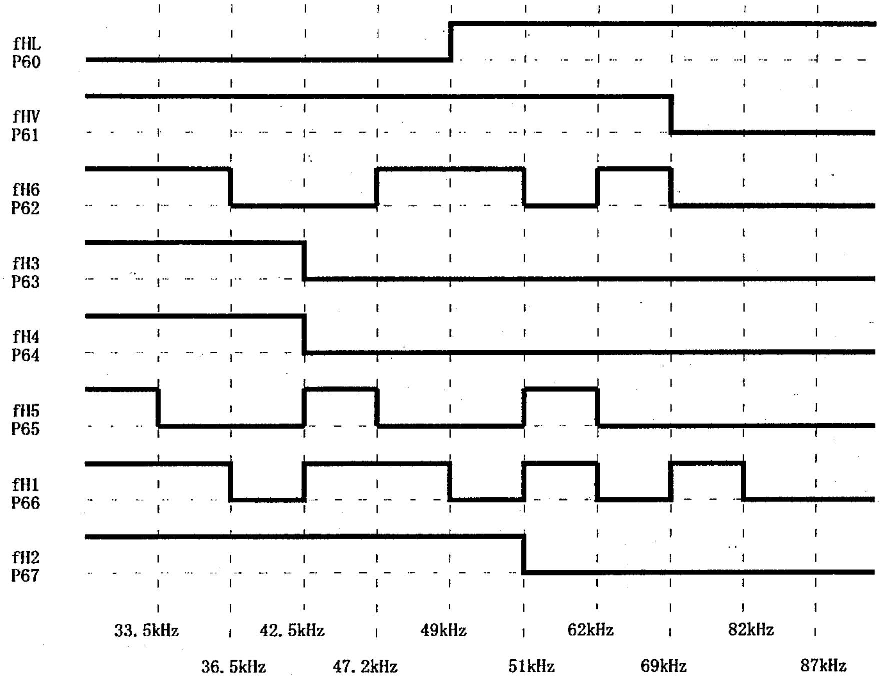


Fig 5.1.1

CONTINUE

NG — CPU (IC801) failure

OK

Check S-correction capacitor switching circuit

Check the operation of MQ581

NG — MQ581 failure

OK

Check whether IC5H1 pin 5 on DEF PWB and IC531 pin 7 vary by horizontal size control in OSM menu or not

Measure the voltage at IC5H1 pin 5 and IC531 pin 7.
Normally, pin 5 voltage varies from approx. 4V to 3V and pin 7 voltage varies from approx. 0.9V to 5V.

NG — Digital control circuit or IC5C1 failure

OK

Check Q554 FBP
See Fig 5.1.2

Measure the voltage at Q554 Collector.
Normally, this voltage varies from 850 to 1100V by H-SIZE control for user.

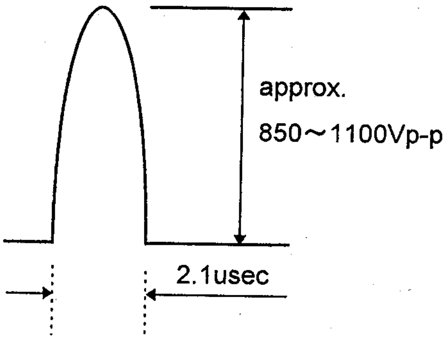


Fig 5.1.2

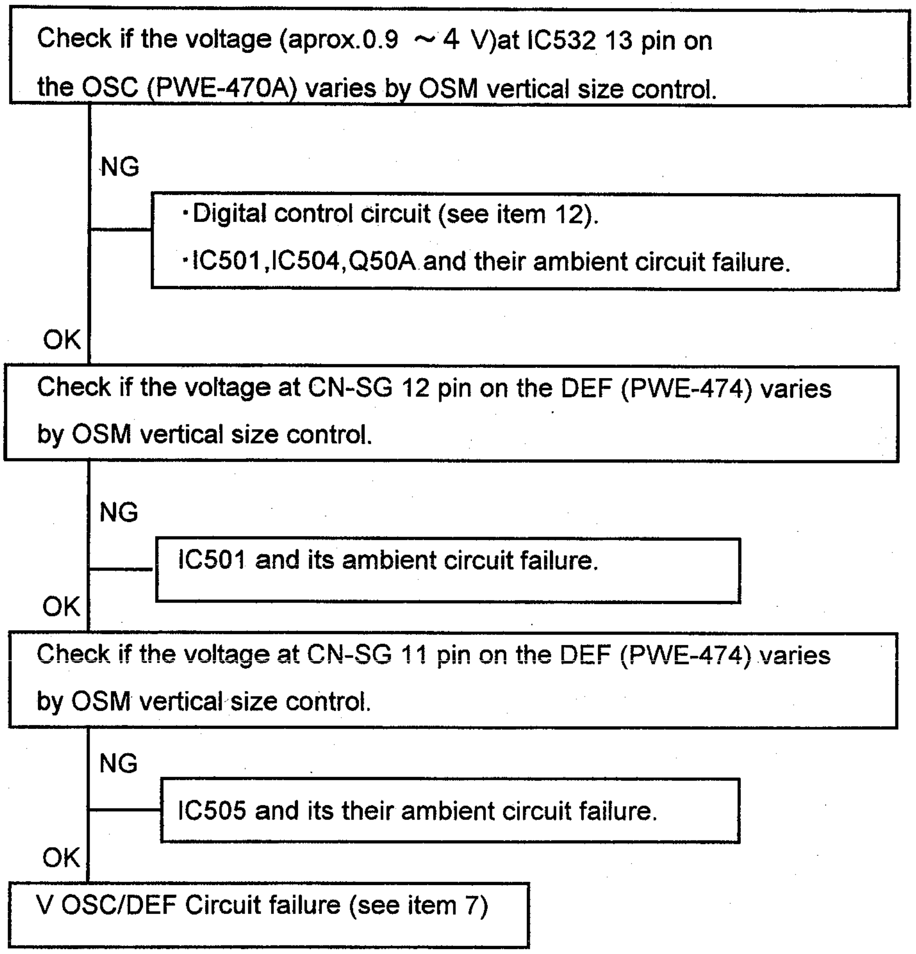
NG — Q554,D553,D555,C553,H-DY and their ambient circuit failure

OK

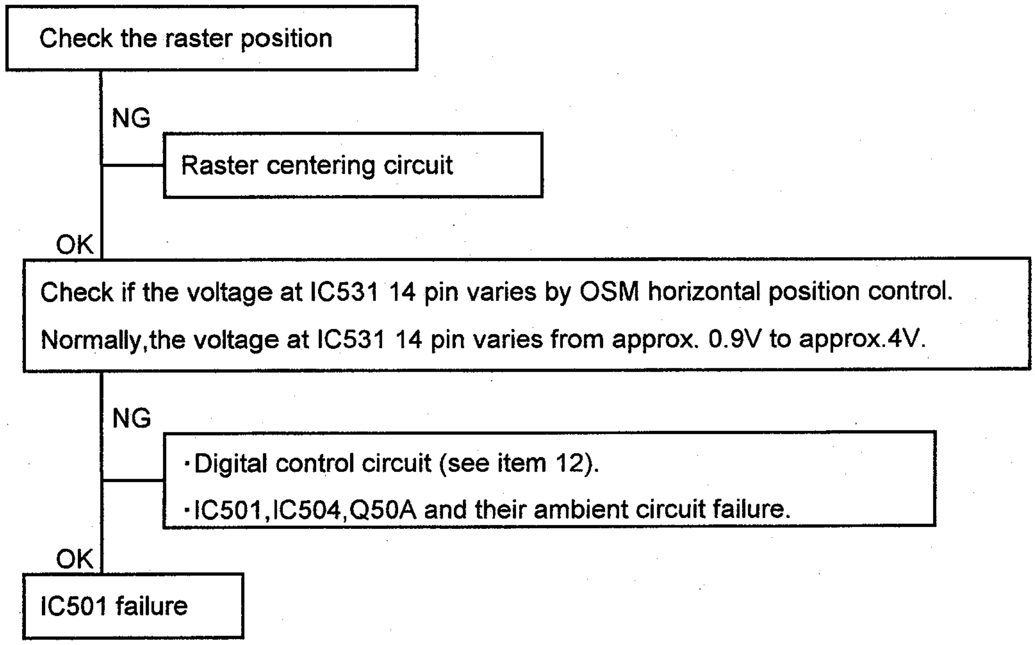
Check the distortion correction circuit (see item)

H OSC/DEF/HV circuit failure (see item)

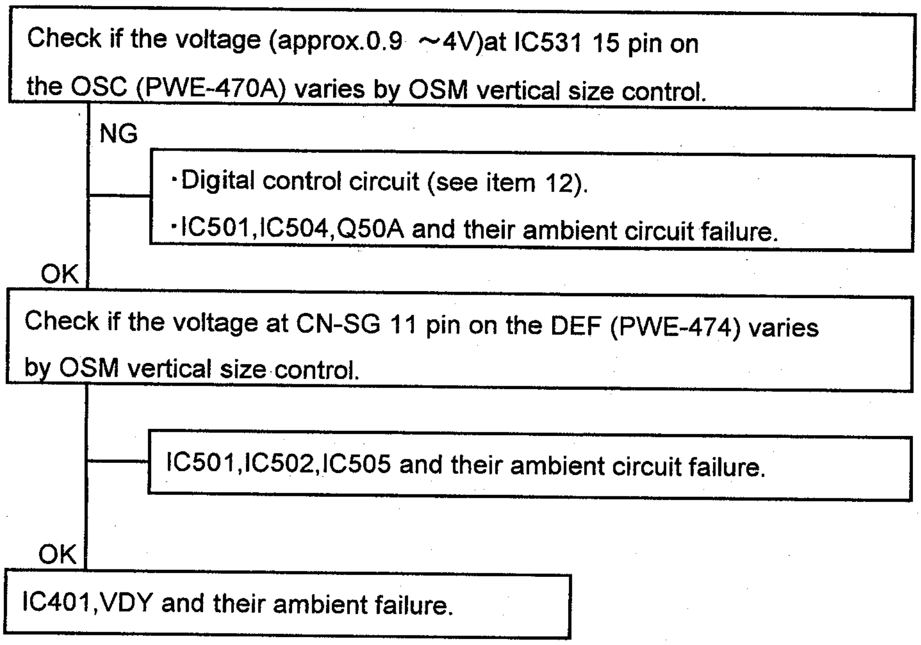
5-2. Vertical Size


Check if the voltage (aprox.0.9 ~ 4 V)at IC532 13 pin on the OSC (PWE-470A) varies by OSM vertical size control.
NG
·Digital control circuit (see item 12).
·IC501,IC504,Q50A and their ambient circuit failure.
OK
Check if the voltage at CN-SG 12 pin on the DEF (PWE-474) varies by OSM vertical size control.
NG
IC501 and its ambient circuit failure.
OK
Check if the voltage at CN-SG 11 pin on the DEF (PWE-474) varies by OSM vertical size control.
NG
IC505 and its their ambient circuit failure.
OK
V OSC/DEF Circuit failure (see item 7)

5-3. Horizontal Position

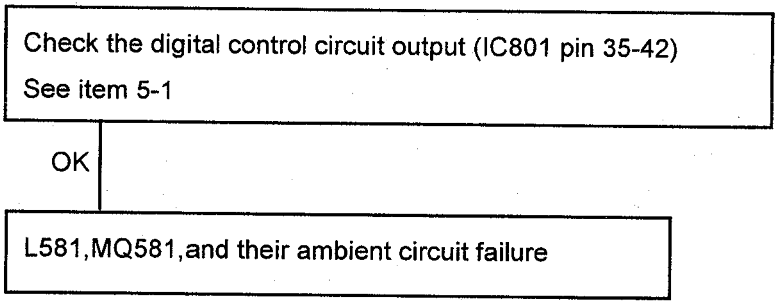

Check the raster position
NG
Raster centering circuit
OK
Check if the voltage at IC531 14 pin varies by OSM horizontal position control.
Normally,the voltage at IC531 14 pin varies from approx. 0.9V to approx.4V.
NG
·Digital control circuit (see item 12).
·IC501,IC504,Q50A and their ambient circuit failure.
OK
IC501 failure

5-4. Vertical Position

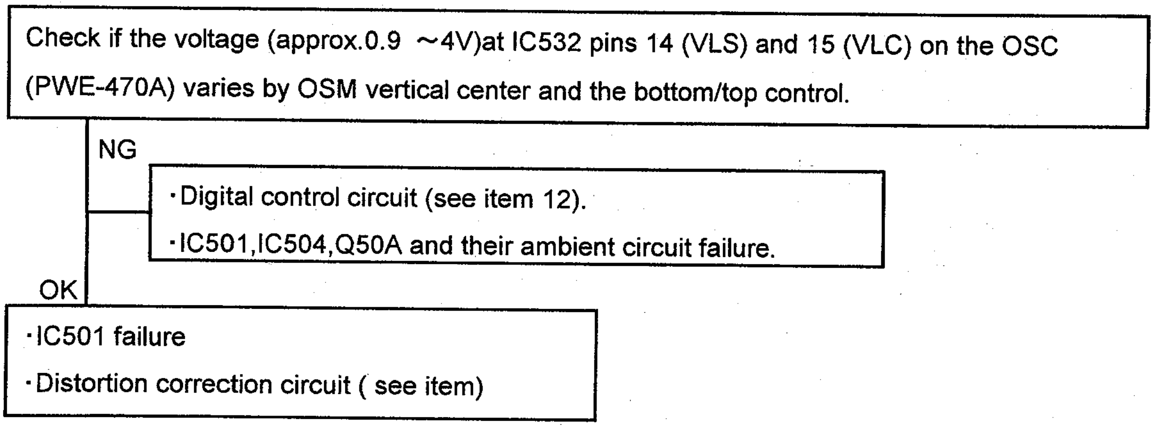

Check if the voltage (approx.0.9 ~4V)at IC531 15 pin on the OSC (PWE-470A) varies by OSM vertical size control.
NG
·Digital control circuit (see item 12).
·IC501,IC504,Q50A and their ambient circuit failure.
OK
Check if the voltage at CN-SG 11 pin on the DEF (PWE-474) varies by OSM vertical size control.
IC501,IC502,IC505 and their ambient circuit failure.
OK
IC401,VDY and their ambient failure.

5-5. Poor Linearity

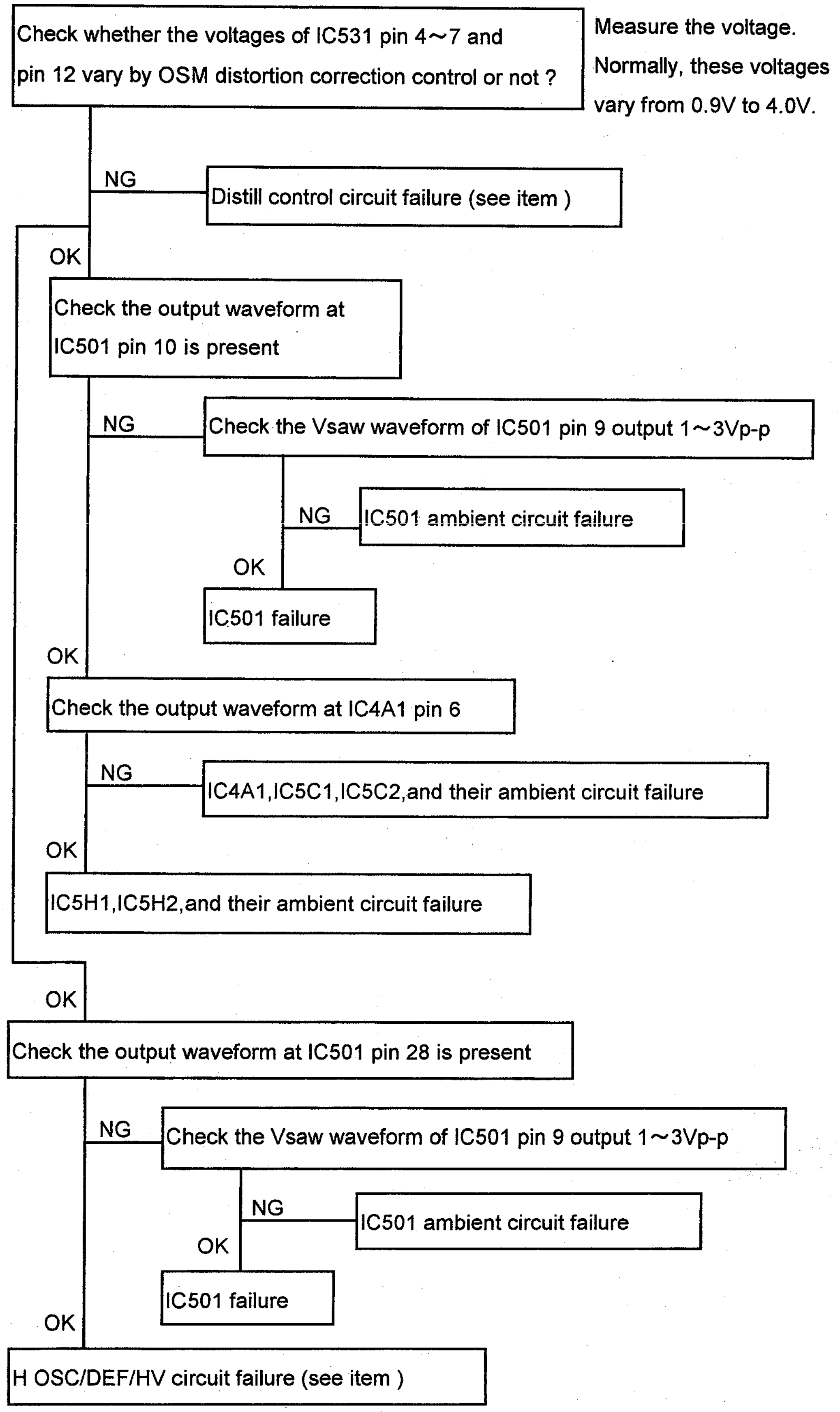
5-5-1. Horizontal


Check the digital control circuit output (IC801 pin 35-42) See item 5-1
OK
L581,MQ581,and their ambient circuit failure

5-5-2. Vertical

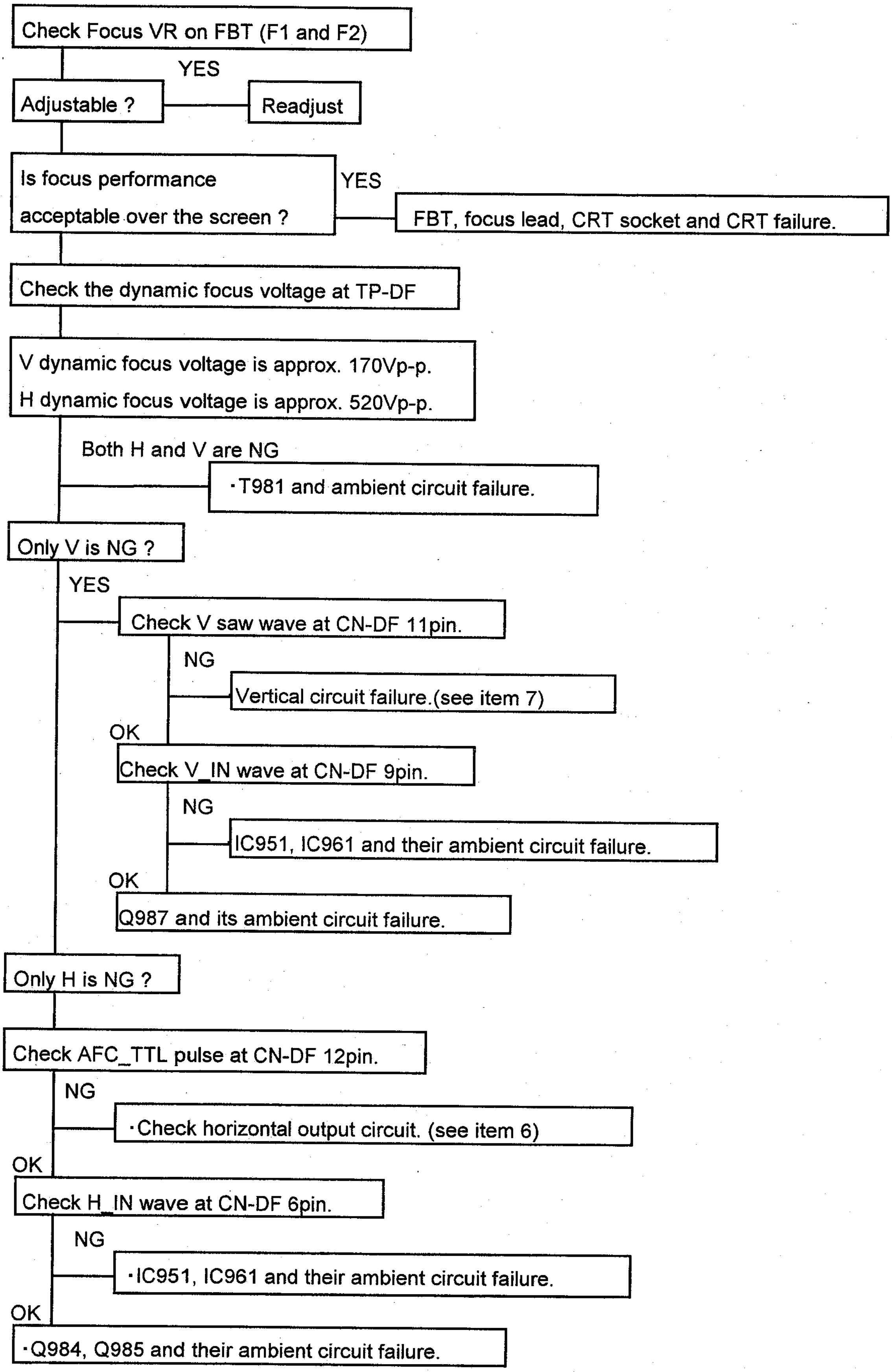

Check if the voltage (approx.0.9 ~4V)at IC532 pins 14 (VLS) and 15 (VLC) on the OSC (PWE-470A) varies by OSM vertical center and the bottom/top control.
NG
·Digital control circuit (see item 12).
·IC501,IC504,Q50A and their ambient circuit failure.
OK
·IC501 failure
·Distortion correction circuit (see item)

5-6. Distortion Correction Circuit

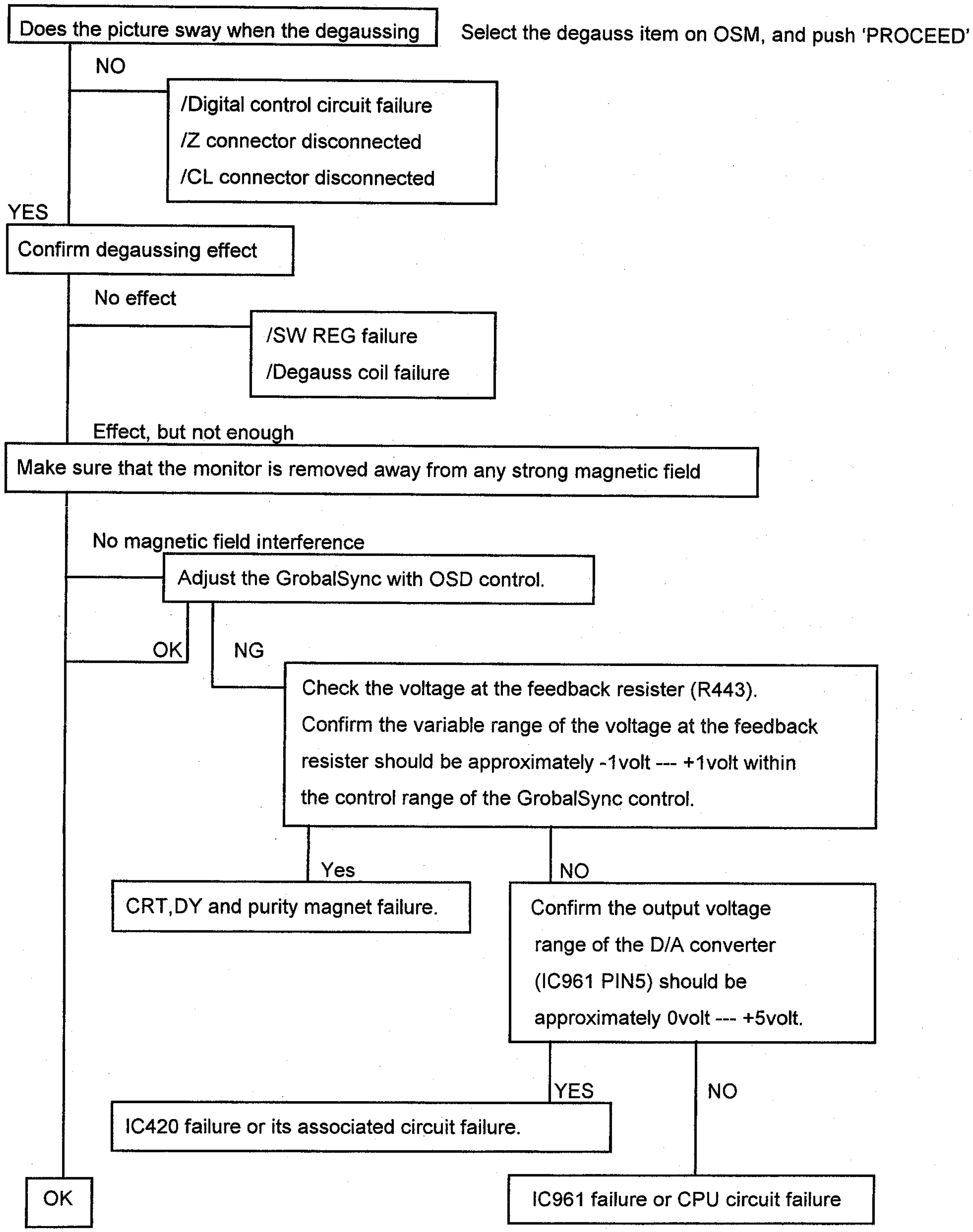

Measure the voltage.
Normally, these voltages vary from 0.9V to 4.0V.

Check whether the voltages of IC531 pin 4~7 and pin 12 vary by OSM distortion correction control or not ?
NG
Distill control circuit failure (see item)
OK
Check the output waveform at IC501 pin 10 is present
NG
Check the Vsaw waveform of IC501 pin 9 output 1~3Vp-p
NG
IC501 ambient circuit failure
OK
IC501 failure
OK
Check the output waveform at IC4A1 pin 6
NG
IC4A1,IC5C1,IC5C2,and their ambient circuit failure
OK
IC5H1,IC5H2,and their ambient circuit failure
OK
Check the output waveform at IC501 pin 28 is present
NG
Check the Vsaw waveform of IC501 pin 9 output 1~3Vp-p
NG
IC501 ambient circuit failure
OK
IC501 failure
OK
H OSC/DEF/HV circuit failure (see item)

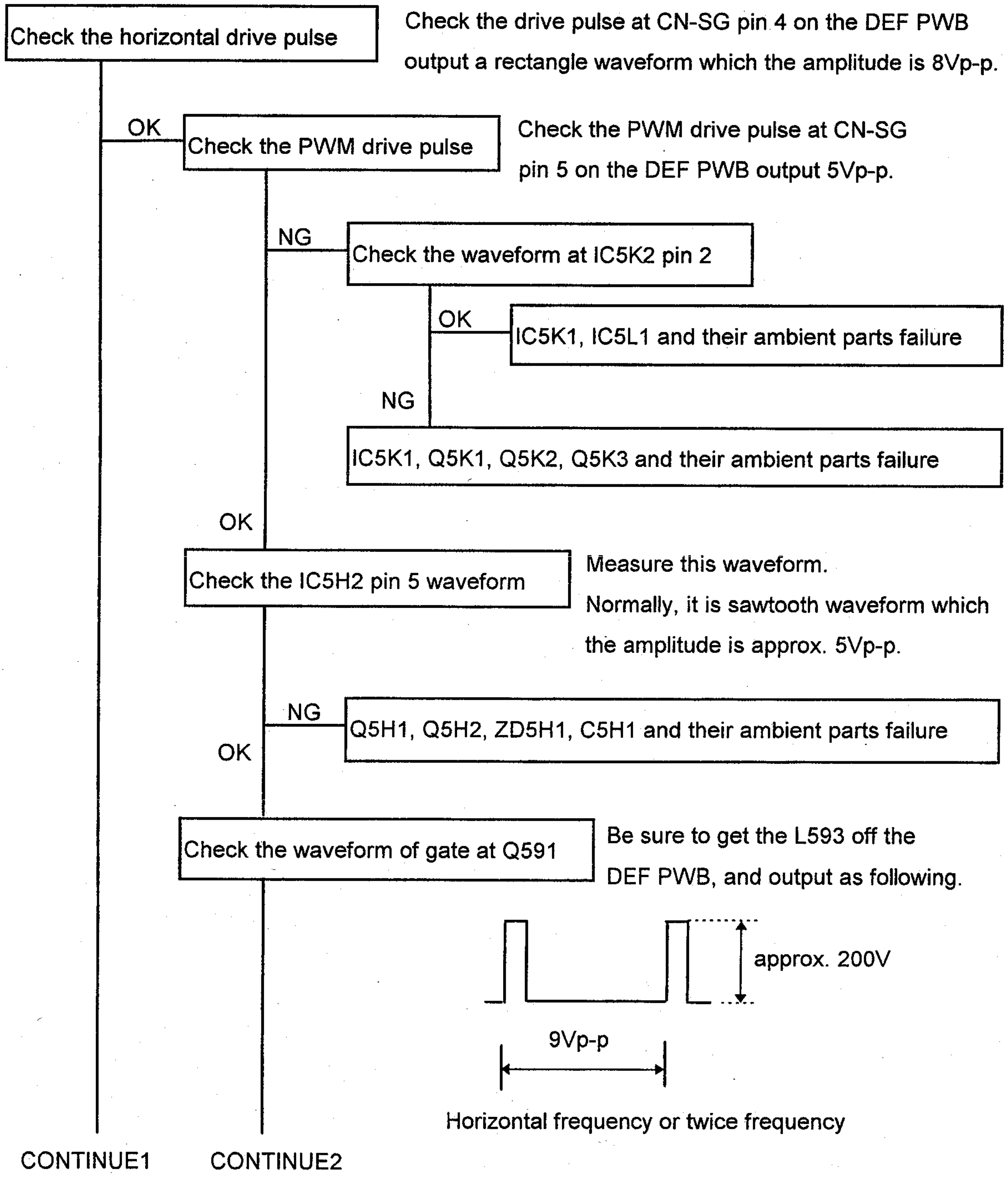
5-7. Poor Focus


Check Focus VR on FBT (F1 and F2)
YES
Adjustable ?
Readjust
Is focus performance acceptable over the screen ?
YES
FBT, focus lead, CRT socket and CRT failure.
Check the dynamic focus voltage at TP-DF
V dynamic focus voltage is approx. 170Vp-p.
H dynamic focus voltage is approx. 520Vp-p.
Both H and V are NG
·T981 and ambient circuit failure.
Only V is NG ?
YES
Check V saw wave at CN-DF 11pin.
NG
Vertical circuit failure.(see item 7)
OK
Check V_IN wave at CN-DF 9pin.
NG
IC951, IC961 and their ambient circuit failure.
OK
Q987 and its ambient circuit failure.
Only H is NG ?
Check AFC_TTL pulse at CN-DF 12pin.
NG
·Check horizontal output circuit. (see item 6)
OK
Check H_IN wave at CN-DF 6pin.
NG
·IC951, IC961 and their ambient circuit failure.
OK
·Q984, Q985 and their ambient circuit failure.

5-8. Impurity On CRT Screen


Does the picture sway when the degaussing
Select the degauss item on OSM, and push 'PROCEED'
NO
/Digital control circuit failure
/Z connector disconnected
/CL connector disconnected
YES
Confirm degaussing effect
No effect
/SW REG failure
/Degauss coil failure
Effect, but not enough
Make sure that the monitor is removed away from any strong magnetic field
No magnetic field interference
Adjust the GrobalSync with OSD control.
OK
NG
Check the voltage at the feedback resister (R443).
Confirm the variable range of the voltage at the feedback resister should be approximately -1volt --- +1volt within the control range of the GrobalSync control.
Yes
NO
CRT,DY and purity magnet failure.
Confirm the output voltage range of the D/A converter (IC961 PIN5) should be approximately 0volt --- +5volt.
YES
NO
IC420 failure or its associated circuit failure.
OK
IC961 failure or CPU circuit failure

6. H OSC / DEF / HV CIRCUIT FAILURE


Check the horizontal drive pulse
OK
Check the PWM drive pulse
NG
Check the waveform at IC5K2 pin 2
OK
IC5K1, IC5L1 and their ambient parts failure
NG
IC5K1, Q5K1, Q5K2, Q5K3 and their ambient parts failure
OK
Check the IC5H2 pin 5 waveform
NG
Q5H1, Q5H2, ZD5H1, C5H1 and their ambient parts failure
OK
Check the waveform of gate at Q591
approx. 200V
9Vp-p
CONTINUE1
CONTINUE2

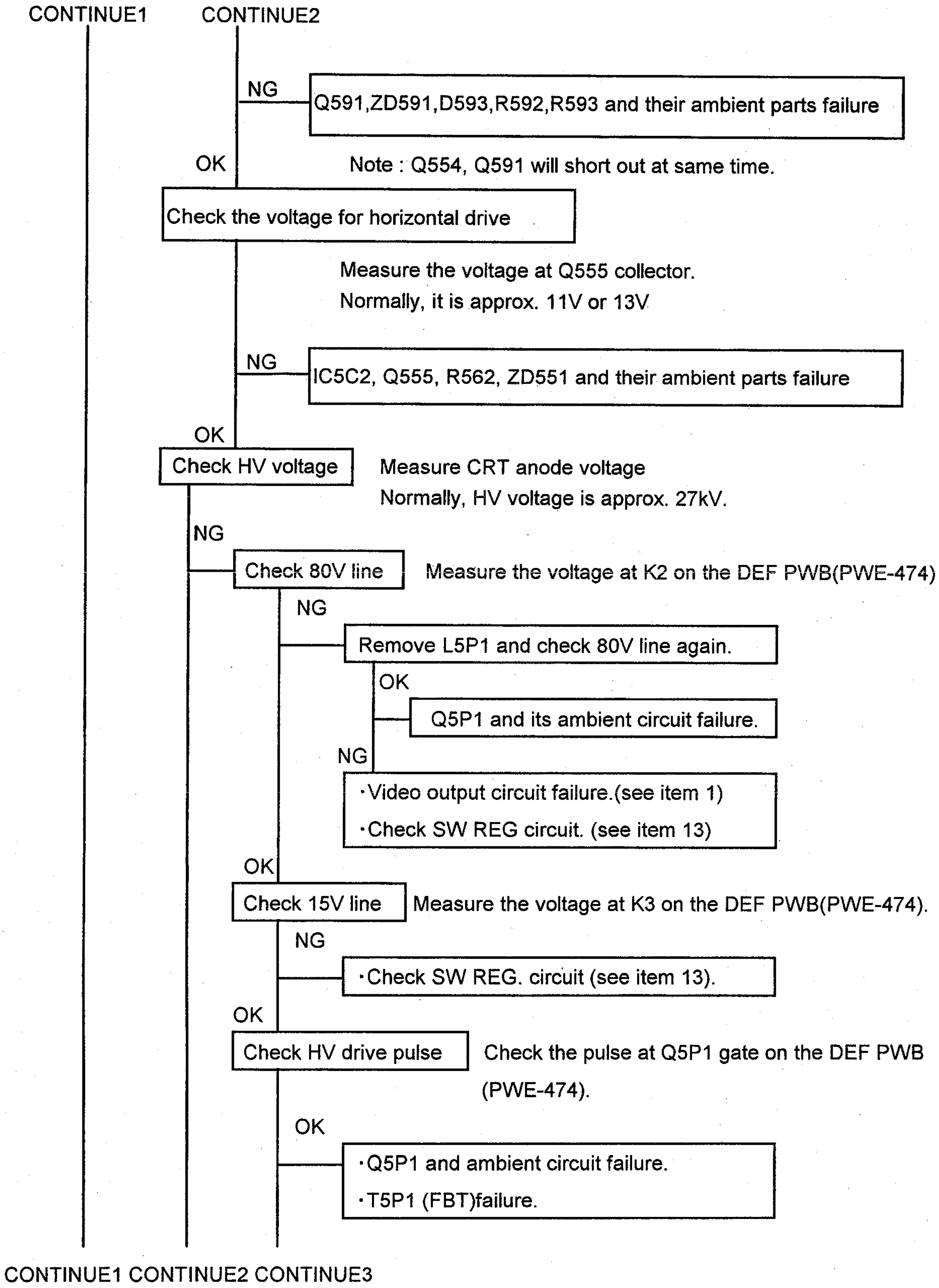
Check the drive pulse at CN-SG pin 4 on the DEF PWB output a rectangle waveform which the amplitude is 8Vp-p.

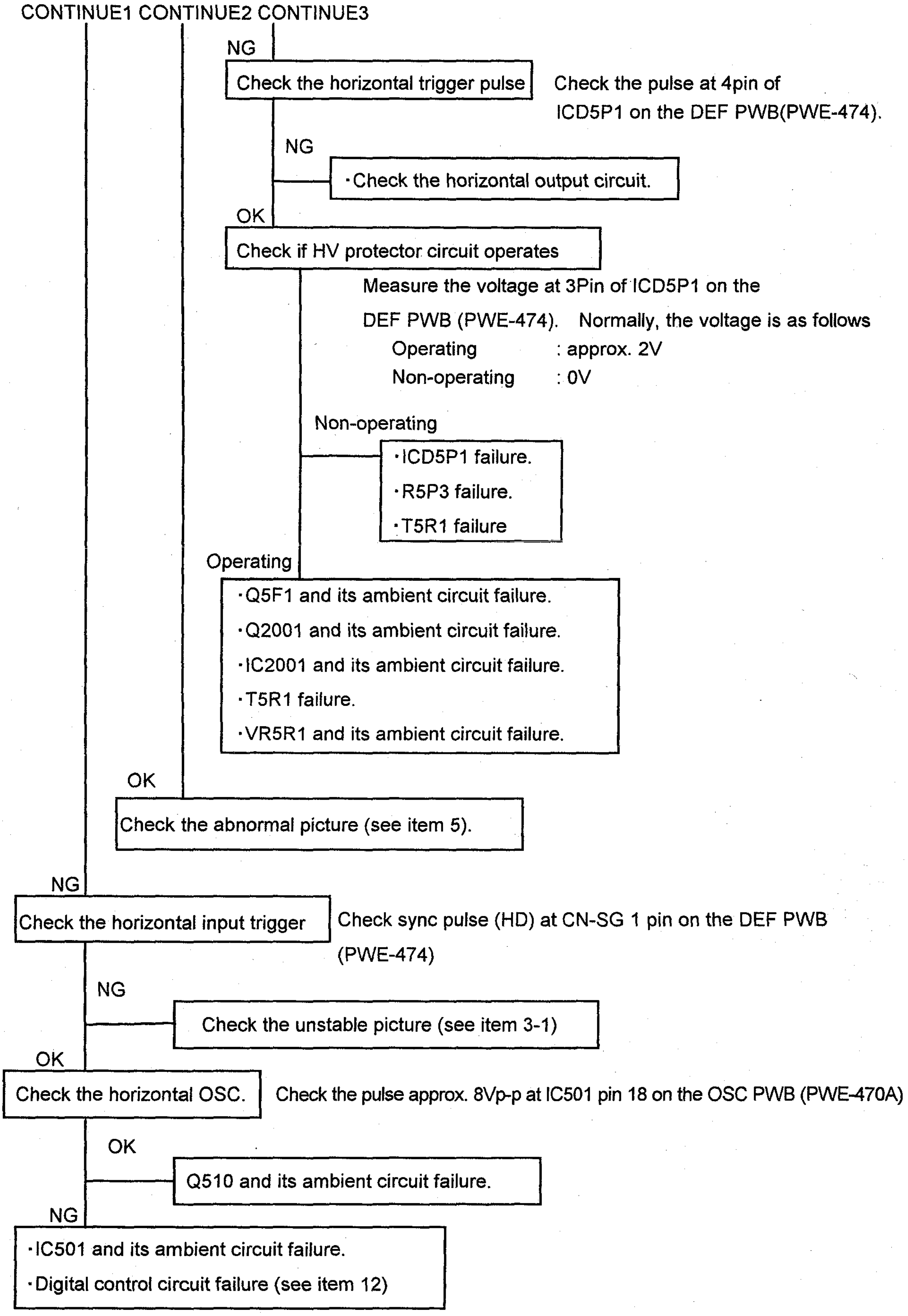
Check the PWM drive pulse at CN-SG pin 5 on the DEF PWB output 5Vp-p.

Measure this waveform.
Normally, it is sawtooth waveform which the amplitude is approx. 5Vp-p.

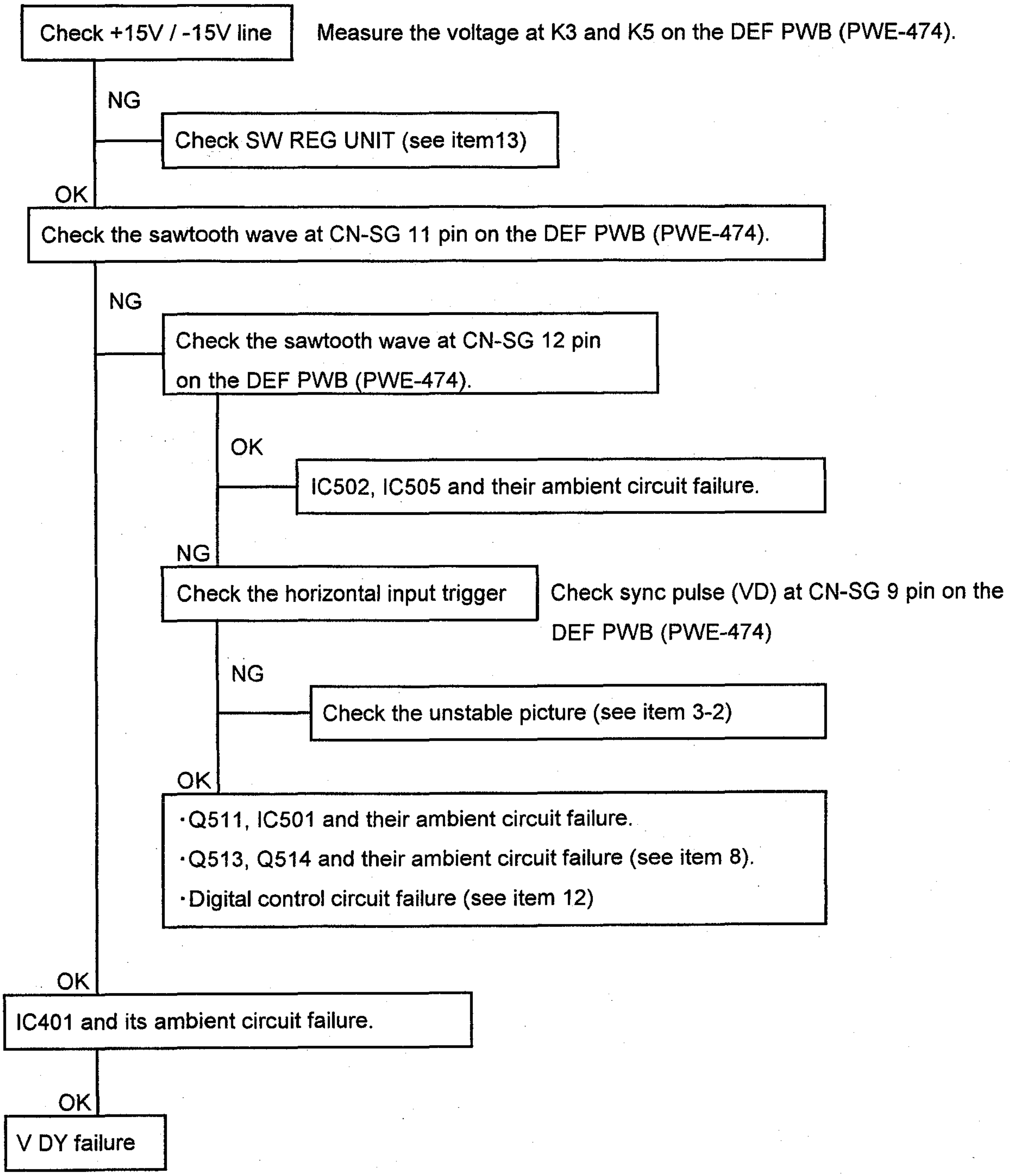
Be sure to get the L593 off the DEF PWB, and output as following.

Horizontal frequency or twice frequency

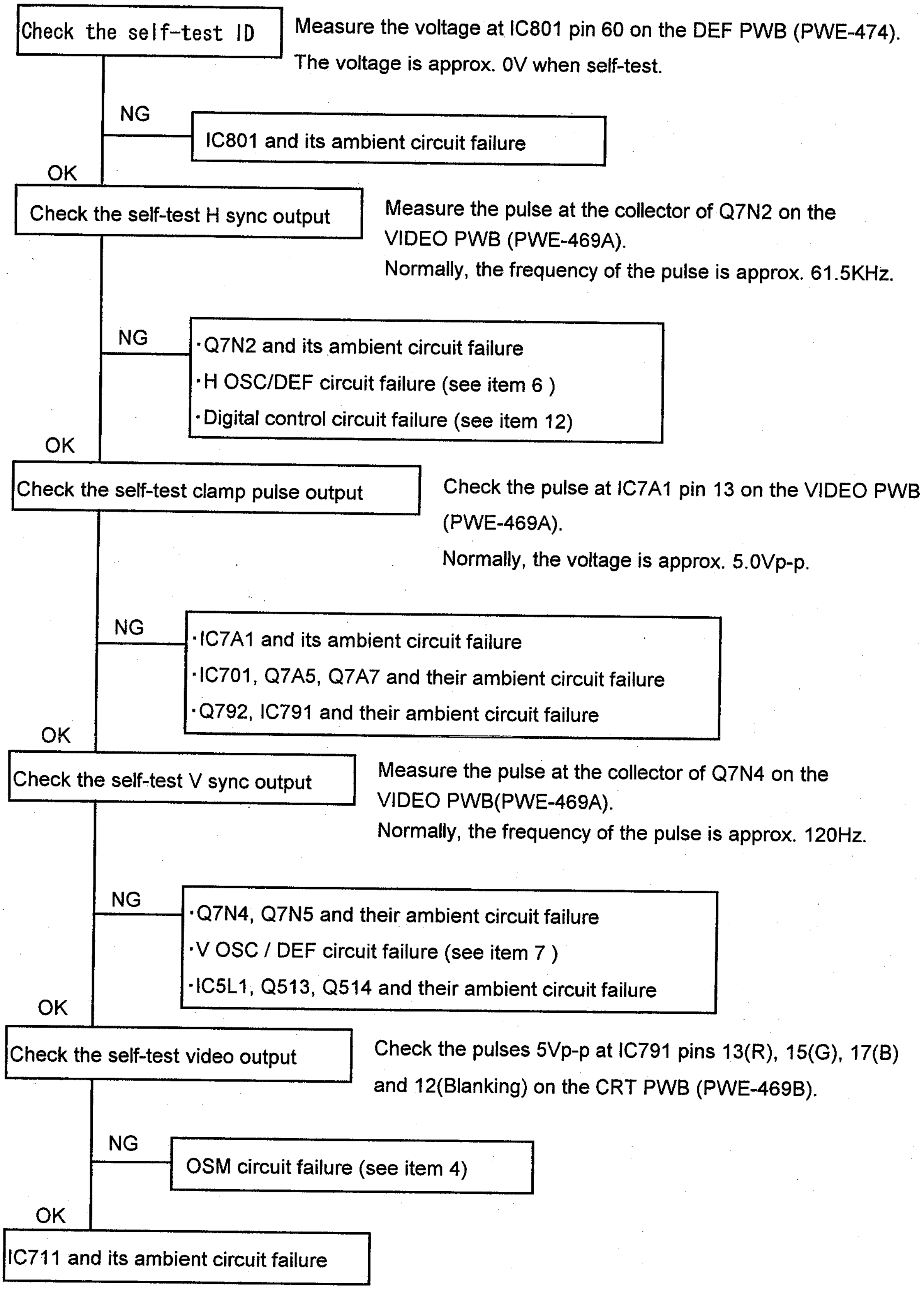

CONTINUE1
CONTINUE2
NG
Q591,ZD591,D593,R592,R593 and their ambient parts failure
OK
Note : Q554, Q591 will short out at same time.
Check the voltage for horizontal drive
Measure the voltage at Q555 collector.
Normally, it is approx. 11V or 13V
NG
IC5C2, Q555, R562, ZD551 and their ambient parts failure
OK
Check HV voltage
Measure CRT anode voltage
Normally, HV voltage is approx. 27kV.
NG
Check 80V line
Measure the voltage at K2 on the DEF PWB(PWE-474)
NG
Remove L5P1 and check 80V line again.
OK
Q5P1 and its ambient circuit failure.
NG
·Video output circuit failure.(see item 1)
·Check SW REG circuit. (see item 13)
OK
Check 15V line
Measure the voltage at K3 on the DEF PWB(PWE-474).
NG
·Check SW REG. circuit (see item 13).
OK
Check HV drive pulse
Check the pulse at Q5P1 gate on the DEF PWB (PWE-474).
OK
·Q5P1 and ambient circuit failure.
·T5P1 (FBT)failure.
CONTINUE1 CONTINUE2 CONTINUE3


CONTINUE1 CONTINUE2 CONTINUE3
NG
Check the horizontal trigger pulse
Check the pulse at 4pin of ICD5P1 on the DEF PWB(PWE-474).
NG
·Check the horizontal output circuit.
OK
Check if HV protector circuit operates
Measure the voltage at 3Pin of ICD5P1 on the DEF PWB (PWE-474). Normally, the voltage is as follows
Operating : approx. 2V
Non-operating : 0V
Non-operating
·ICD5P1 failure.
·R5P3 failure.
·T5R1 failure
Operating
·Q5F1 and its ambient circuit failure.
·Q2001 and its ambient circuit failure.
·IC2001 and its ambient circuit failure.
·T5R1 failure.
·VR5R1 and its ambient circuit failure.
OK
Check the abnormal picture (see item 5).
NG
Check the horizontal input trigger
Check sync pulse (HD) at CN-SG 1 pin on the DEF PWB (PWE-474)
NG
Check the unstable picture (see item 3-1)
OK
Check the horizontal OSC.
Check the pulse approx. 8Vp-p at IC501 pin 18 on the OSC PWB (PWE-470A)
OK
Q510 and its ambient circuit failure.
NG
·IC501 and its ambient circuit failure.
·Digital control circuit failure (see item 12)

7. V OSC / DEF CIRCUIT FAILURE


Check +15V / -15V line
Measure the voltage at K3 and K5 on the DEF PWB (PWE-474).
NG
Check SW REG UNIT (see item13)
OK
Check the sawtooth wave at CN-SG 11 pin on the DEF PWB (PWE-474).
NG
Check the sawtooth wave at CN-SG 12 pin on the DEF PWB (PWE-474).
OK
IC502, IC505 and their ambient circuit failure.
NG
Check the horizontal input trigger
Check sync pulse (VD) at CN-SG 9 pin on the DEF PWB (PWE-474)
NG
Check the unstable picture (see item 3-2)
OK
·Q511, IC501 and their ambient circuit failure.
·Q513, Q514 and their ambient circuit failure (see item 8).
·Digital control circuit failure (see item 12)
OK
IC401 and its ambient circuit failure.
OK
V DY failure

8. SELF TEST ERROR



Check the self-test ID

Measure the voltage at IC801 pin 60 on the DEF PWB (PWE-474).
The voltage is approx. 0V when self-test.

NG: IC801 and its ambient circuit failure

Check the self-test H sync output

Measure the pulse at the collector of Q7N2 on the VIDEO PWB (PWE-469A).
Normally, the frequency of the pulse is approx. 61.5KHz.

NG:
- Q7N2 and its ambient circuit failure
- H OSC/DEF circuit failure (see item 6)
- Digital control circuit failure (see item 12)

Check the self-test clamp pulse output

Check the pulse at IC7A1 pin 13 on the VIDEO PWB (PWE-469A).
Normally, the voltage is approx. 5.0Vp-p.

NG:
- IC7A1 and its ambient circuit failure
- IC701, Q7A5, Q7A7 and their ambient circuit failure
- Q792, IC791 and their ambient circuit failure

Check the self-test V sync output

Measure the pulse at the collector of Q7N4 on the VIDEO PWB(PWE-469A).
Normally, the frequency of the pulse is approx. 120Hz.

NG:
- Q7N4, Q7N5 and their ambient circuit failure
- V OSC / DEF circuit failure (see item 7)
- IC5L1, Q513, Q514 and their ambient circuit failure

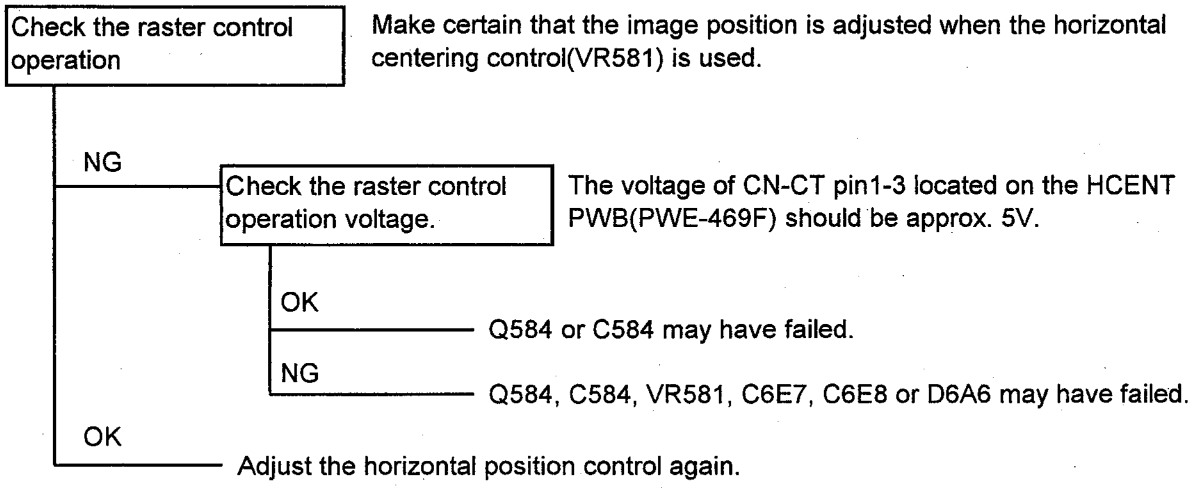
Check the self-test video output

Check the pulses 5Vp-p at IC791 pins 13(R), 15(G), 17(B) and 12(Blanking) on the CRT PWB (PWE-469B).

NG: OSM circuit failure (see item 4)

OK: IC711 and its ambient circuit failure

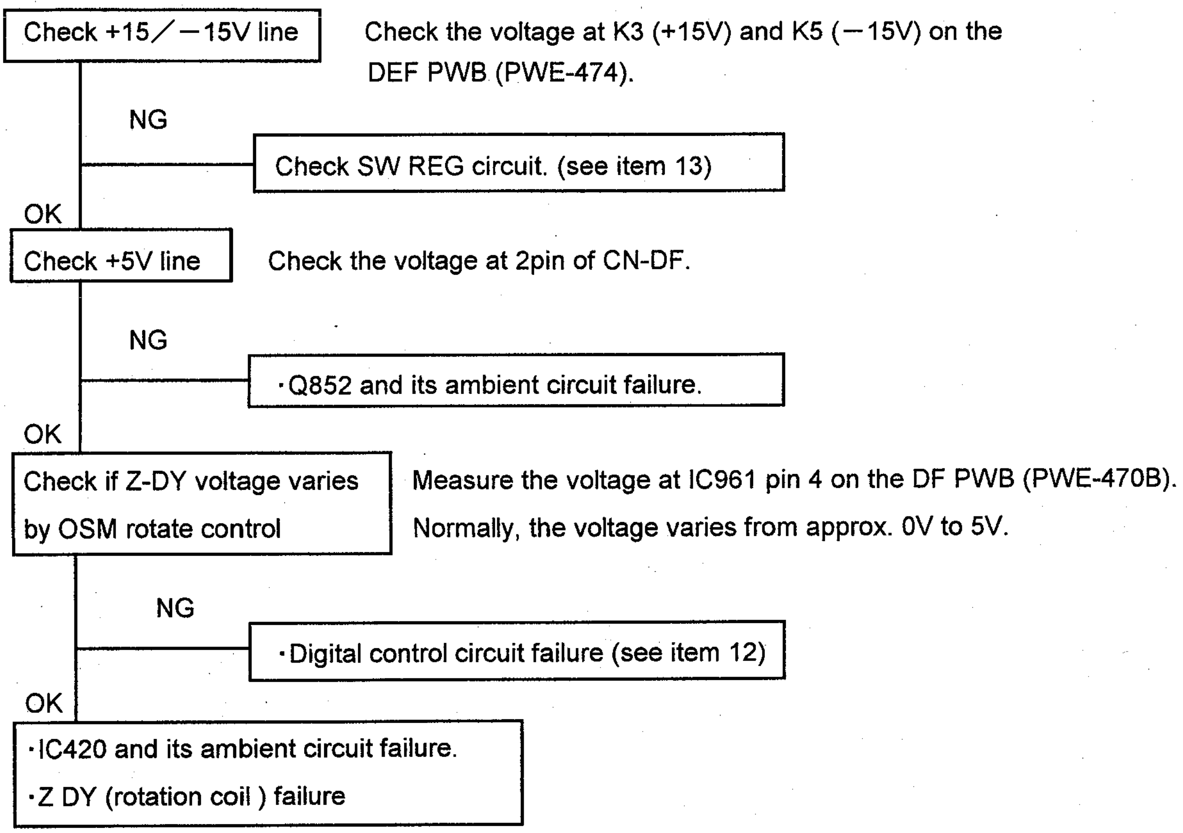
9. RASTER CENTERING CIRCUIT FAILURE



Check the raster control operation — Make certain that the image position is adjusted when the horizontal centering control(VR581) is used.

- NG: Check the raster control operation voltage. — The voltage of CN-CT pin1-3 located on the HCENT PWB(PWE-469F) should be approx. 5V.
  - OK: Q584 or C584 may have failed.
  - NG: Q584, C584, VR581, C6E7, C6E8 or D6A6 may have failed.
- OK: Adjust the horizontal position control again.

10. RASTER ROTATION ERROR

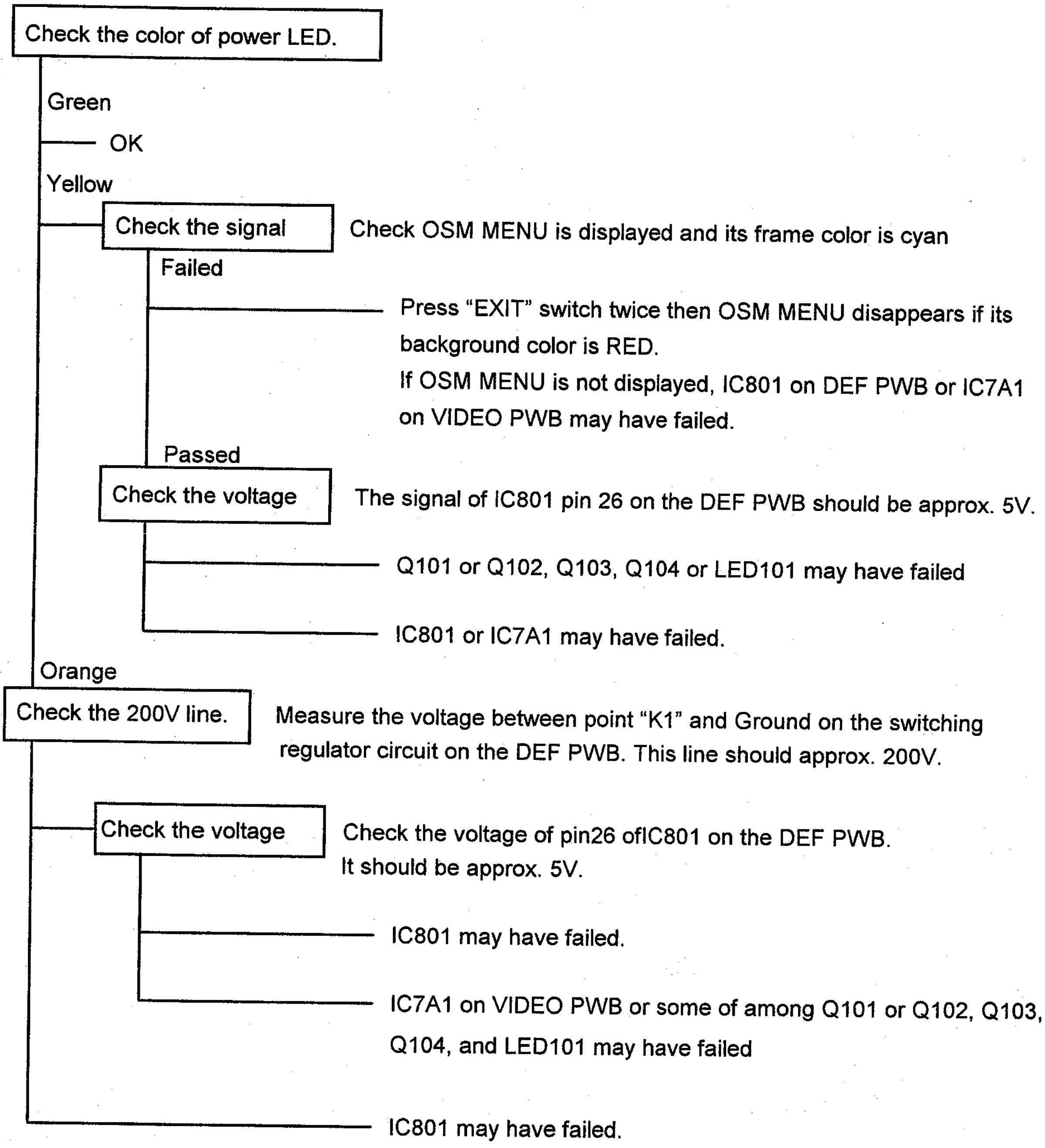


Check +15／−15V line — Check the voltage at K3 (+15V) and K5 (−15V) on the DEF PWB (PWE-474).

- NG: Check SW REG circuit. (see item 13)
- OK: Check +5V line — Check the voltage at 2pin of CN-DF.
  - NG: ·Q852 and its ambient circuit failure.
  - OK: Check if Z-DY voltage varies by OSM rotate control — Measure the voltage at IC961 pin 4 on the DF PWB (PWE-470B). Normally, the voltage varies from approx. 0V to 5V.
    - NG: ·Digital control circuit failure (see item 12)
    - OK: ·IC420 and its ambient circuit failure. ·Z DY (rotation coil) failure

11. POWER MANAGEMENT SYSTEM (PMS) FAILURE

11-1. PMS FAILURE 1(When a monitor receives Horizontal and Vertical Sync.)



- Check the color of power LED.
  - Green
    - OK
  - Yellow
    - Check the signal: Check OSM MENU is displayed and its frame color is cyan
      - Failed
        - Press "EXIT" switch twice then OSM MENU disappears if its background color is RED. If OSM MENU is not displayed, IC801 on DEF PWB or IC7A1 on VIDEO PWB may have failed.
      - Passed
    - Check the voltage: The signal of IC801 pin 26 on the DEF PWB should be approx. 5V.
      - Q101 or Q102, Q103, Q104 or LED101 may have failed
      - IC801 or IC7A1 may have failed.
  - Orange
    - Check the 200V line. Measure the voltage between point "K1" and Ground on the switching regulator circuit on the DEF PWB. This line should approx. 200V.
      - Check the voltage: Check the voltage of pin26 ofIC801 on the DEF PWB. It should be approx. 5V.
        - IC801 may have failed.
        - IC7A1 on VIDEO PWB or some of among Q101 or Q102, Q103, Q104, and LED101 may have failed
      - IC801 may have failed.

11-2. PMS FAILURE 2(When a monitor receives no Horizontal Sync)

Check the PMS control voltage.

Check the voltage of pin 26 of IC801.
The voltage should be approx. 5V.

Failed — IC801 or IC7A1 may have failed.

Passed — IC801 may have failed

11-3. PMS FAILURE 3(When a monitor receives no Vertical Sync)

Check the PMS control voltage.

Check the voltage of pin 33 of IC801.
The voltage should be approx. 0V.

Failed — IC801 or IC7A1 may have failed

Passed — IC801 may have failed. In case power consumption is too high, then some of Q851, Q852, Q855, Q856, Q857, Q858(DEF PWB) , and Q858(SW. REG PWB) may have failed

11-4. PMS FAILURE 4(When monitor receives neither Horizontal nor Vertical Sync)

Check the PMS control voltage.

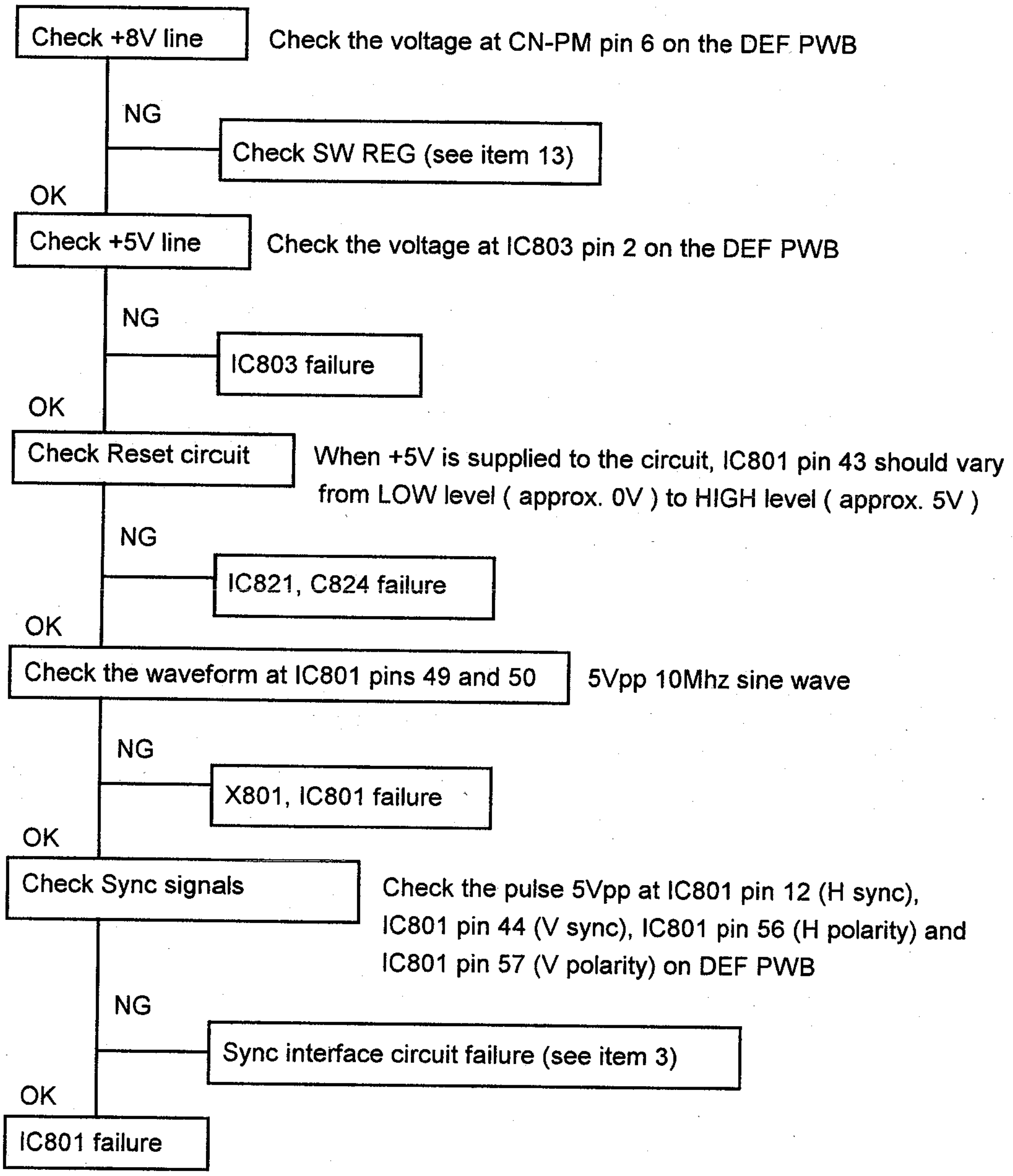
Check the voltage of pin 26 of IC801.
The voltage should be approx. 0V.

Failed — IC801 or IC7A1 may have failed.

Passed — PC601 may have failed.

12. DIGITAL CONTROL CIRCUIT FAILURE

12-1. Digital control error


Check +8V line
NG
Check SW REG (see item 13)
OK
Check +5V line
NG
IC803 failure
OK
Check Reset circuit
NG
IC821, C824 failure
OK
Check the waveform at IC801 pins 49 and 50
NG
X801, IC801 failure
OK
Check Sync signals
NG
Sync interface circuit failure (see item 3)
OK
IC801 failure

Check the voltage at CN-PM pin 6 on the DEF PWB

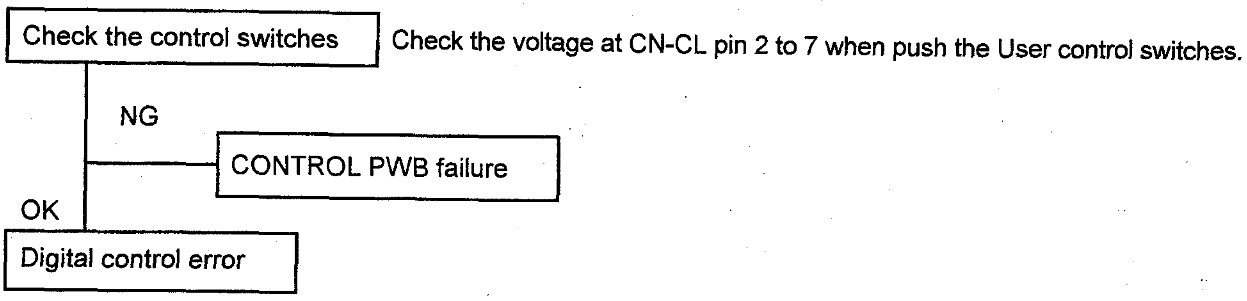
Check the voltage at IC803 pin 2 on the DEF PWB

When +5V is supplied to the circuit, IC801 pin 43 should vary from LOW level (approx. 0V) to HIGH level (approx. 5V)

5Vpp 10Mhz sine wave

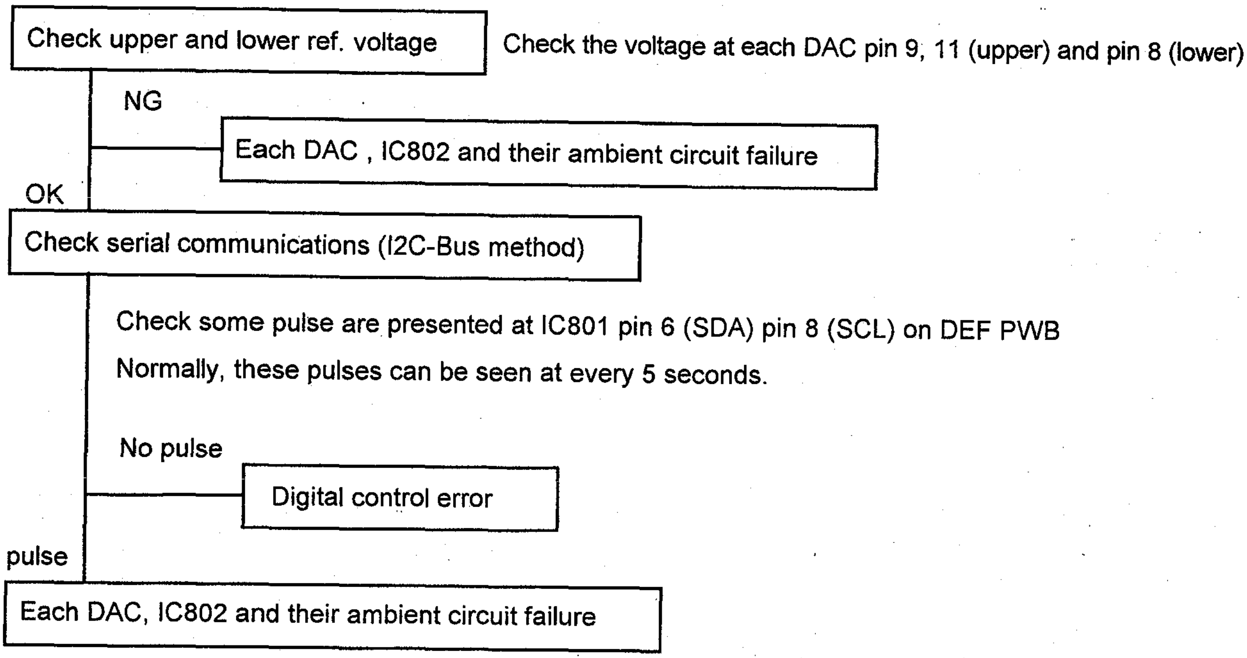
Check the pulse 5Vpp at IC801 pin 12 (H sync), IC801 pin 44 (V sync), IC801 pin 56 (H polarity) and IC801 pin 57 (V polarity) on DEF PWB

12-2. User control error


Check the control switches
NG
CONTROL PWB failure
OK
Digital control error

Check the voltage at CN-CL pin 2 to 7 when push the User control switches.

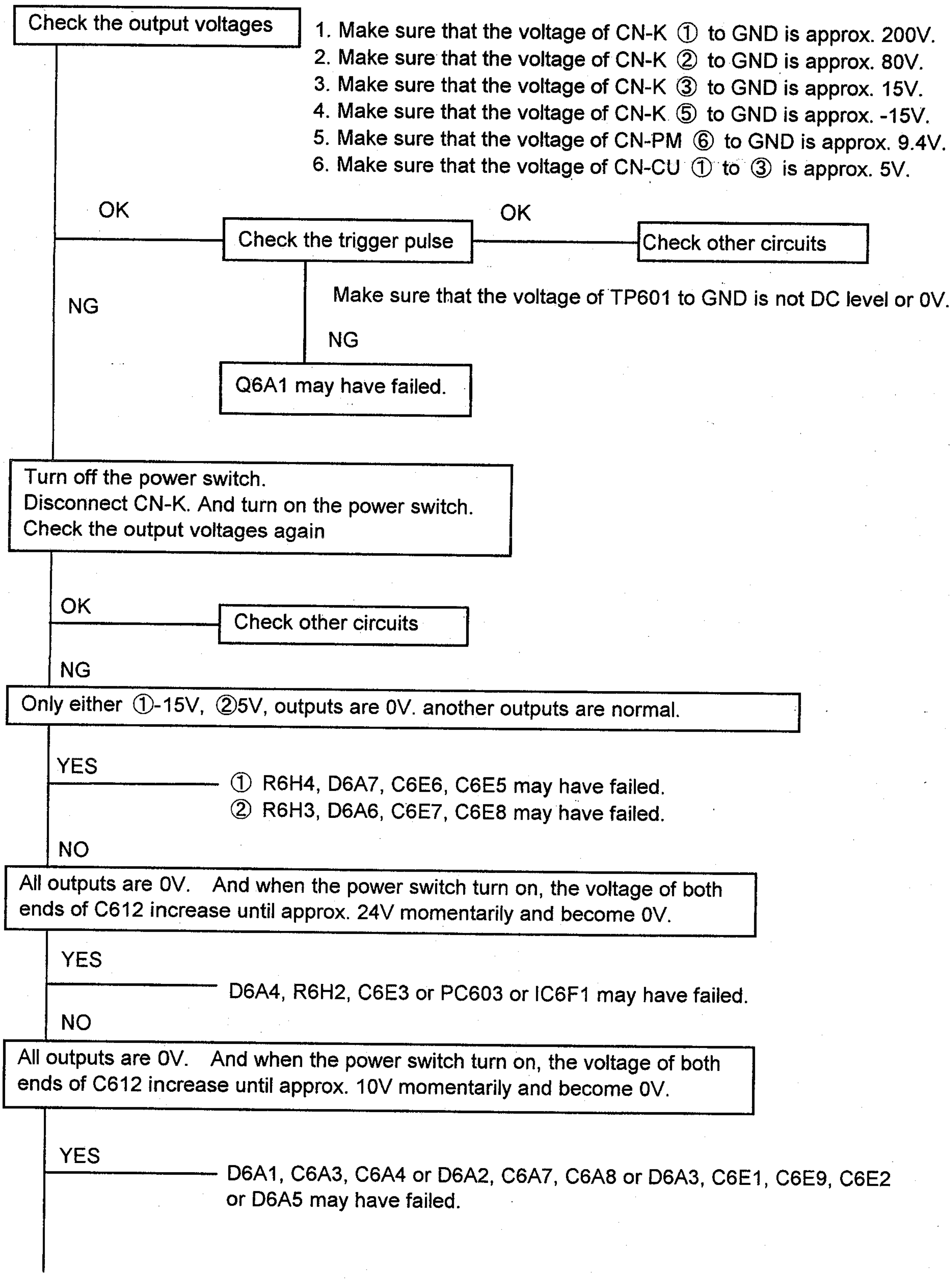
12-3. DAC output error


Check upper and lower ref. voltage
NG
Each DAC , IC802 and their ambient circuit failure
OK
Check serial communications (I2C-Bus method)
No pulse
Digital control error
pulse
Each DAC, IC802 and their ambient circuit failure

Check the voltage at each DAC pin 9, 11 (upper) and pin 8 (lower)

Check some pulse are presented at IC801 pin 6 (SDA) pin 8 (SCL) on DEF PWB
Normally, these pulses can be seen at every 5 seconds.

13. SWITCHING REGULATOR CIRCUIT FAILURE



Check the output voltages

1. Make sure that the voltage of CN-K ① to GND is approx. 200V.
2. Make sure that the voltage of CN-K ② to GND is approx. 80V.
3. Make sure that the voltage of CN-K ③ to GND is approx. 15V.
4. Make sure that the voltage of CN-K ⑤ to GND is approx. -15V.
5. Make sure that the voltage of CN-PM ⑥ to GND is approx. 9.4V.
6. Make sure that the voltage of CN-CU ① to ③ is approx. 5V.

OK

Check the trigger pulse

OK

Check other circuits

Make sure that the voltage of TP601 to GND is not DC level or 0V.

NG

Q6A1 may have failed.

NG

Turn off the power switch.
Disconnect CN-K. And turn on the power switch.
Check the output voltages again

OK

Check other circuits

NG

Only either ①-15V, ②5V, outputs are 0V. another outputs are normal.

YES

① R6H4, D6A7, C6E6, C6E5 may have failed.
② R6H3, D6A6, C6E7, C6E8 may have failed.

NO

All outputs are 0V. And when the power switch turn on, the voltage of both ends of C612 increase until approx. 24V momentarily and become 0V.

YES

D6A4, R6H2, C6E3 or PC603 or IC6F1 may have failed.

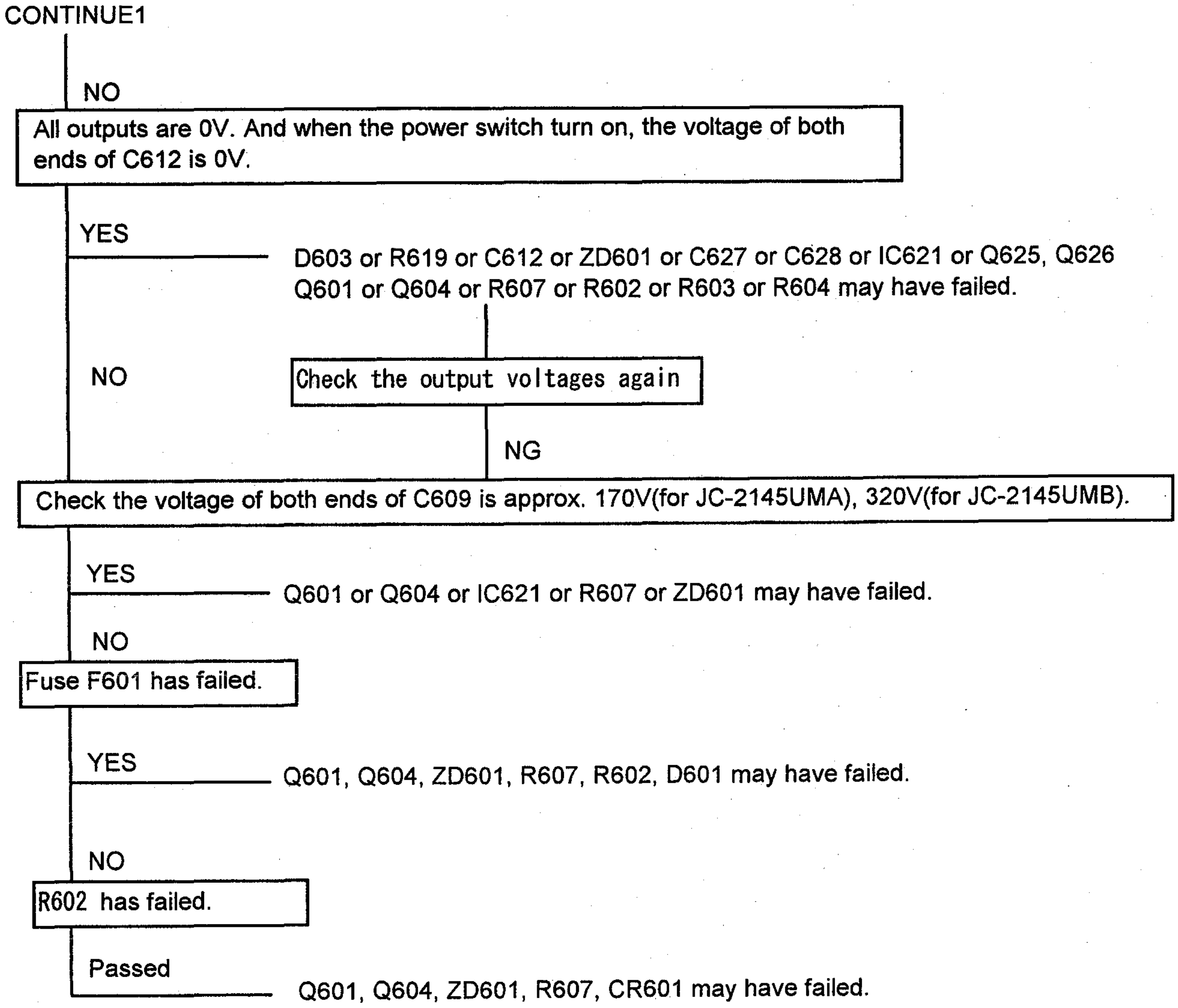
NO

All outputs are 0V. And when the power switch turn on, the voltage of both ends of C612 increase until approx. 10V momentarily and become 0V.

YES

D6A1, C6A3, C6A4 or D6A2, C6A7, C6A8 or D6A3, C6E1, C6E9, C6E2 or D6A5 may have failed.

CONTINUE1



CONTINUE1

NO

All outputs are 0V. And when the power switch turn on, the voltage of both ends of C612 is 0V.

YES

D603 or R619 or C612 or ZD601 or C627 or C628 or IC621 or Q625, Q626 Q601 or Q604 or R607 or R602 or R603 or R604 may have failed.

Check the output voltages again

NG

NO

Check the voltage of both ends of C609 is approx. 170V(for JC-2145UMA), 320V(for JC-2145UMB).

YES

Q601 or Q604 or IC621 or R607 or ZD601 may have failed.

NO

Fuse F601 has failed.

YES

Q601, Q604, ZD601, R607, R602, D601 may have failed.

NO

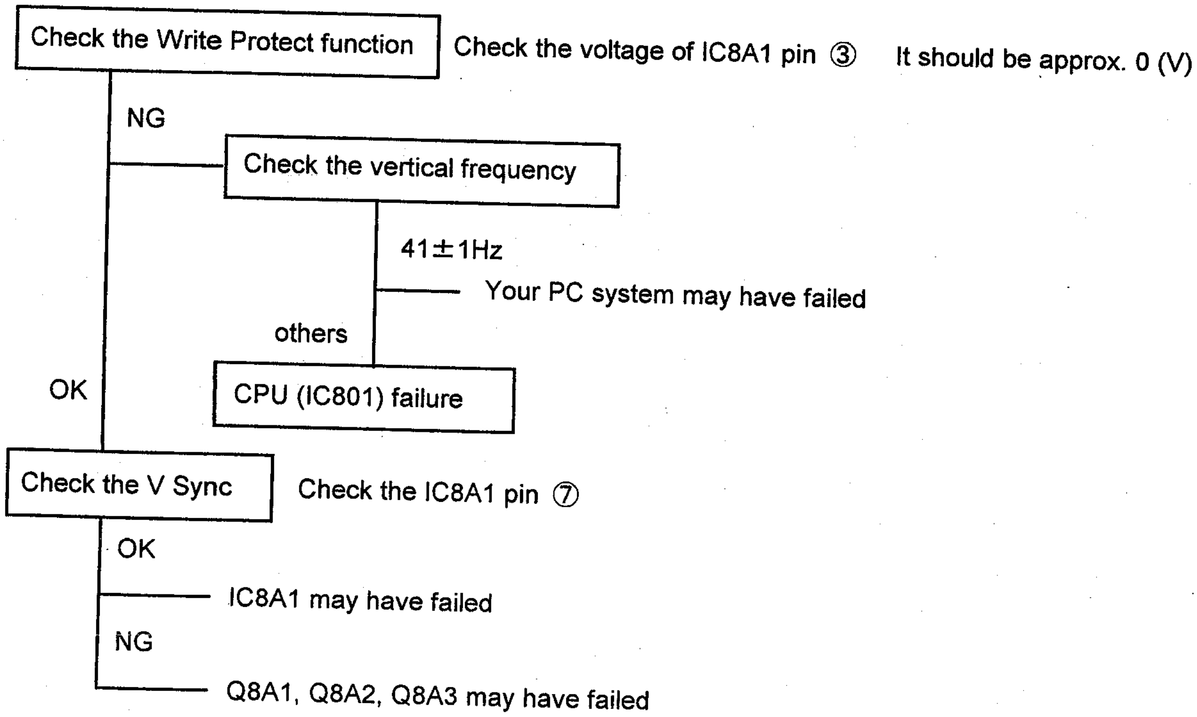
R602 has failed.

Passed

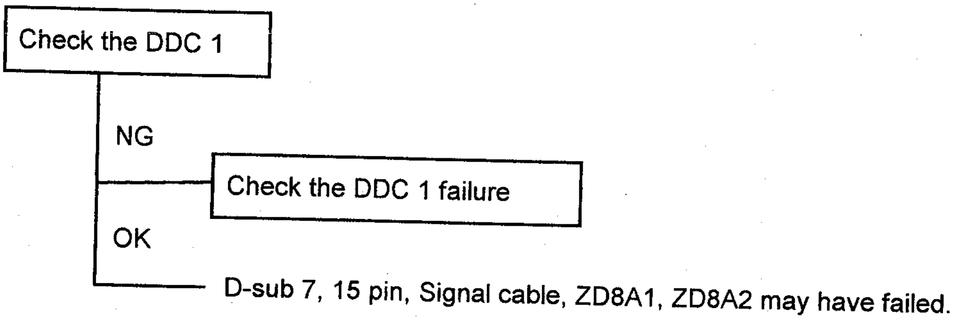
Q601, Q604, ZD601, R607, CR601 may have failed.

14. PLUG & PLAY FAILURE

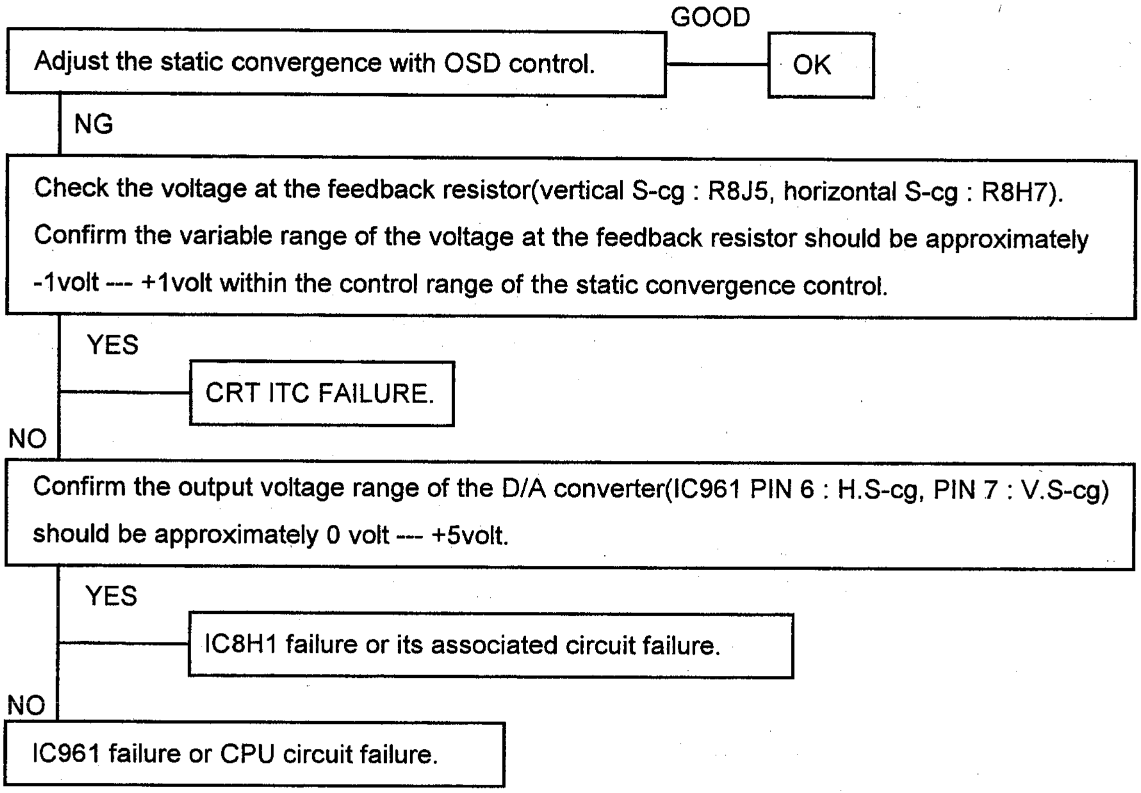
14-1. DDC 1 failure


Check the Write Protect function
Check the voltage of IC8A1 pin ③
It should be approx. 0 (V)
NG
Check the vertical frequency
41±1Hz
Your PC system may have failed
others
CPU (IC801) failure
OK
Check the V Sync
Check the IC8A1 pin ⑦
OK
IC8A1 may have failed
NG
Q8A1, Q8A2, Q8A3 may have failed

14-2. DDC 2B failure


Check the DDC 1
NG
Check the DDC 1 failure
OK
D-sub 7, 15 pin, Signal cable, ZD8A1, ZD8A2 may have failed.

15. Out of Cg-specification



Adjust the static convergence with OSD control.

Check the voltage at the feedback resistor(vertical S-cg : R8J5, horizontal S-cg : R8H7). Confirm the variable range of the voltage at the feedback resistor should be approximately -1volt --- +1volt within the control range of the static convergence control.

Confirm the output voltage range of the D/A converter(IC961 PIN 6 : H.S-cg, PIN 7 : V.S-cg) should be approximately 0 volt --- +5volt.

IC8H1 failure or its associated circuit failure.

IC961 failure or CPU circuit failure.

CIRCUIT DESCRIPTION

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1. VIDEO CIRCUIT

1) Video Signal Amplification

The video signal amplification section basically consists of the input section circuit and the amplification circuit. Each Red(R),Green(G) and Blue(B) video signal circuit is identical to each other. The G circuit is described below. The input selection circuit selects the BNC input or D-SUB input according to the voltage of IC701 pin 17 (open or 0V) . The amplification circuit is constructed with IC702(Attenuator), buffer Q702G, IC711(Pre-amp), buffer Q711G, IC721(Output amp), AccuColor controller IC703(MDAC) and gain controller IC731(DAC). The selected input signal is fed to IC702 and attenuated according to the user CONTRAST control. This attenuated video signal and the gain control signal from IC731(DAC) are applied to IC711. The output of IC711 is buffered by Q711G and fed to IC721(Output amp), the signal is amplified to the proper voltage swing required at the CRT cathode.

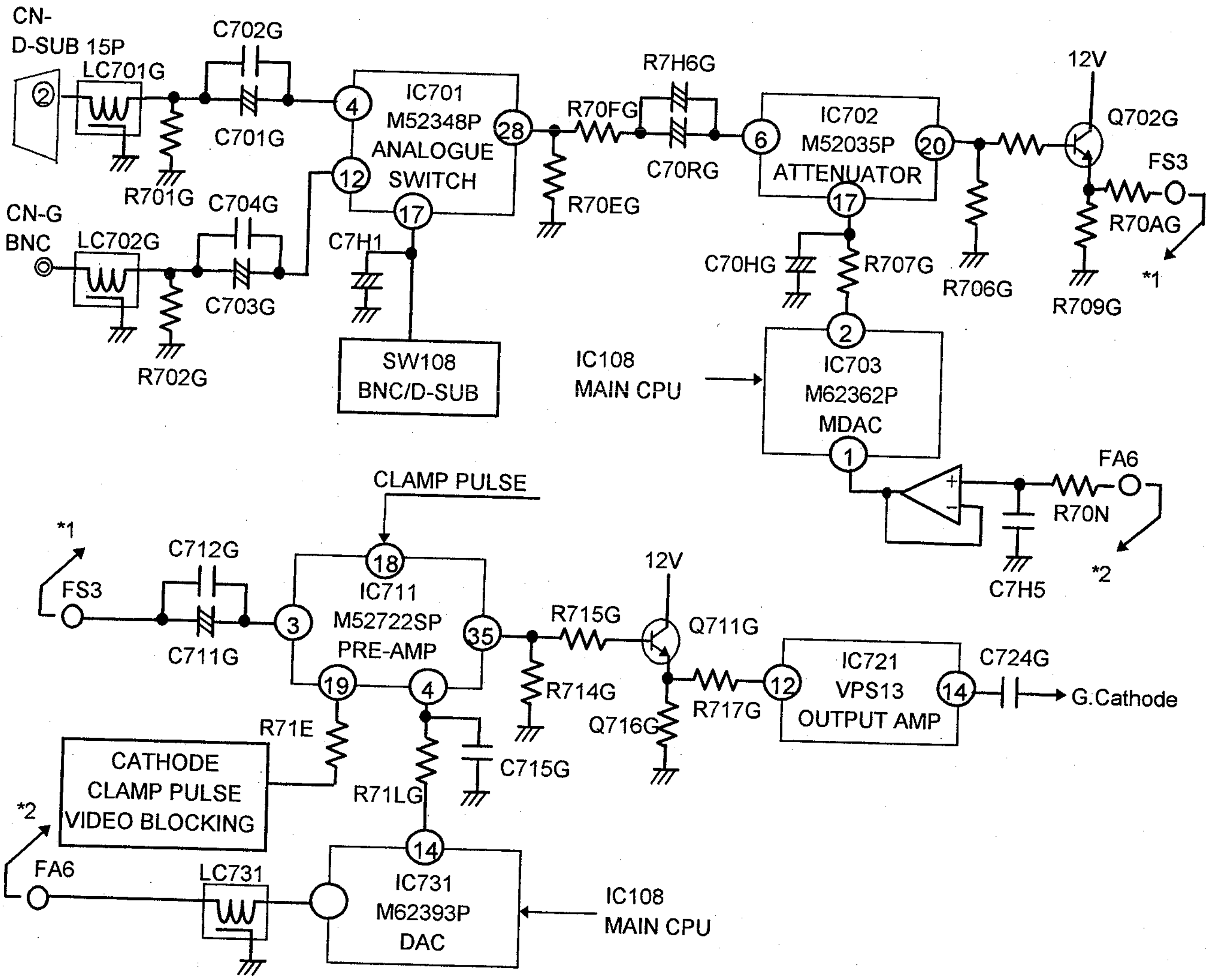
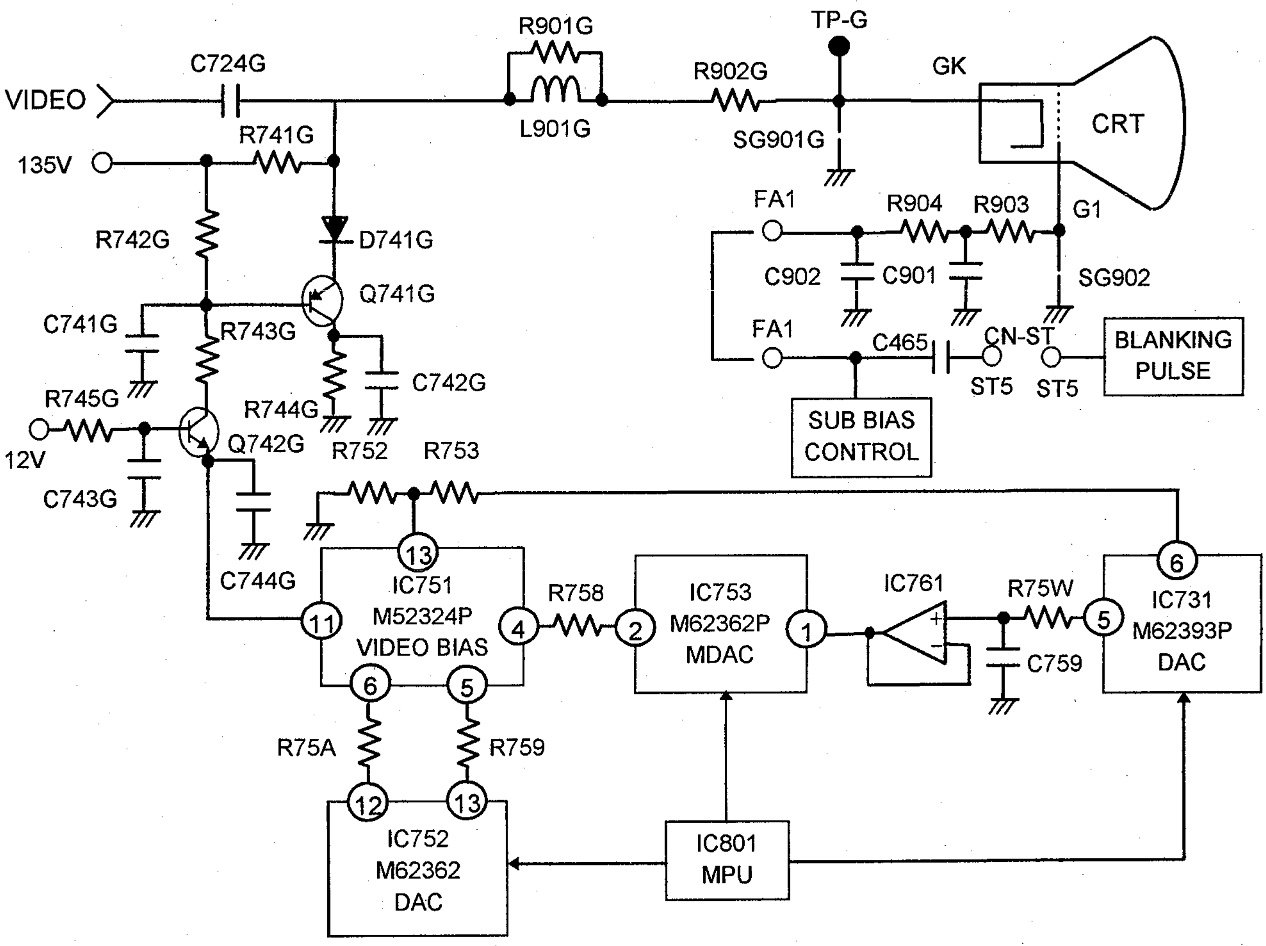

CN-
D-SUB 15P
②
LC701G
C702G
C701G
R701G
CN-G
BNC
LC702G
C704G
C703G
R702G
IC701
M52348P
ANALOGUE
SWITCH
④
⑫
⑰
㉘
C7H1
SW108
BNC/D-SUB
R70FG
R7H6G
C70RG
R70EG
IC702
M52035P
ATTENUATOR
⑥
⑳
⑰
C70HG
R707G
R706G
12V
Q702G
FS3
R70AG
R709G
*1
IC108
MAIN CPU
IC703
M62362P
MDAC
②
①
FA6
R70N
C7H5
*2
CLAMP PULSE
*1
FS3
C712G
C711G
IC711
M52722SP
PRE-AMP
⑱
③
㉟
⑲
④
R715G
R714G
12V
Q711G
Q716G
R717G
IC721
VPS13
OUTPUT AMP
⑫
⑭
C724G
G.Cathode
R71E
CATHODE
CLAMP PULSE
VIDEO BLOCKING
R71LG
C715G
*2
FA6
LC731
IC731
M62393P
DAC
⑭
IC108
MAIN CPU

Fig. 1.1 Video Amplification Circuit

2) Brightness and Cut-off Control

The brightness and cut-off control circuit consist of the brightness control circuit (IC753 and IC731), the cut-off circuit (IC751 and IC752) and the cathode clamp circuit. In this section, the green video circuit will be described. The user BRIGHTNESS control by IC801(MPU) determines the output voltage of IC753(MDAC) and IC752(DAC), in effect the sink current to IC751 pin 11 is controlled and the current to the collector of Q742G consequentially. The clamp level is determined by R742G voltage drop caused by this current deviation. When a voltage of $2.5V_{DC}$ is applied to IC751 pin 13, the DC clamp level becomes the cut-off level.



VIDEO
C724G
R901G
L901G
R902G
TP-G
GK
CRT
SG901G
135V
R741G
R742G
D741G
Q741G
C741G
R743G
R745G
12V
Q742G
C743G
R744G
C742G
R752
R753
C744G
FA1
R904
R903
G1
C902
C901
SG902
FA1
C465
CN-ST
ST5
ST5
BLANKING PULSE
SUB BIAS CONTROL
13
IC751
M52324P
VIDEO BIAS
11
4
6
5
R758
2
IC753
M62362P
MDAC
1
IC761
+
-
R75W
C759
5
6
IC731
M62393P
DAC
R75A
R759
12
13
IC752
M62362
DAC
IC801
MPU

Fig. 1.2 Brightness and Cut-off Control

3) ABL Circuit

The ABL circuit consists Q771, Q772, and their surrounding components which detect and amplify the current flowing to the CRT anode IC731 and IC711 control the gain of the video signal (R, G and B) and the OSM signals. The ABL circuit limits the amplitude of the video signal and keeps the maximum average current flowing to the CRT to 700 μ A. When the anode current is less than 700 μ A, the voltage of CN-ST pin 1 is clamped at 12.6V with D771. When the anode current attempts to exceed 700 μ A, the voltage drop of R5R1 and R5R2 causes the voltage of CN-ST pin 1 to be lower than 12.6V. The resultant voltage causes Q771 and Q772 to operate and attenuates the input voltage of IC731. The output voltage of IC731 drops bringing the gain of IC711 down.

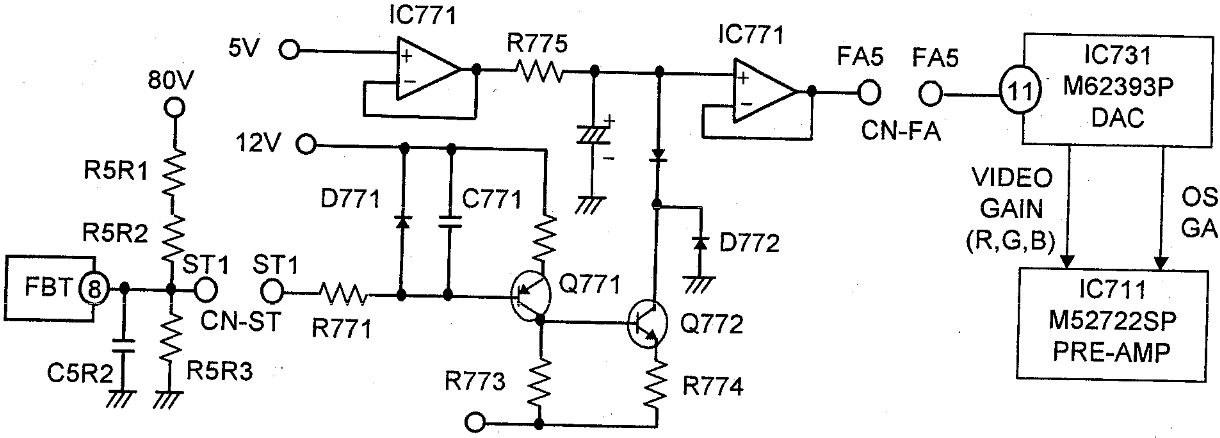

IC771
5V
R775
IC771
FA5
FA5
IC731
M62393P
DAC
11
80V
12V
CN-FA
R5R1
D771
C771
VIDEO
GAIN
(R,G,B)
OSM
GAIN
R5R2
D772
FBT
8
ST1
ST1
Q771
IC711
M52722SP
PRE-AMP
CN-ST
R771
Q772
C5R2
R5R3
R773
R774

Fig. 1.3 ABL Circuit

4) On Screen Manager (OSM)

The OSM circuit consists of IC791(OSM controller) and IC711(Pre-amp) which matrix the video signal and the OSM signal. IC791 receives the display data from IC801(MPU), and the signal outputs R, G, B and Blanking are fed out of pins 13,15,17 and 12 respectively. The OSM signals are mixed with video signals in IC711(Pre-amp). The OSM screen brightness is controlled by the DC voltage applied to IC711 pin 36.

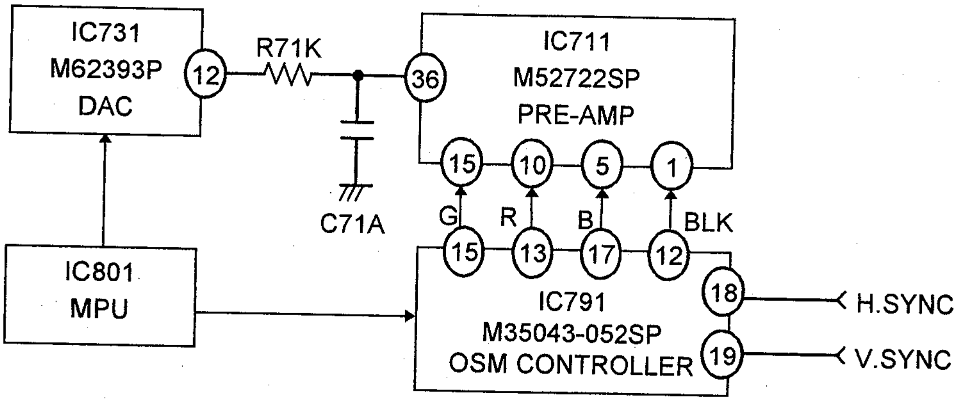

IC731
M62393P
DAC
12
R71K
36
IC711
M52722SP
PRE-AMP
15
10
5
1
C71A
G
R
B
BLK
15
13
17
12
IC801
MPU
18
H.SYNC
IC791
M35043-052SP
OSM CONTROLLER
19
V.SYNC

Fig. 1.4 On Screen Manager

5) Self Test

To activate the self test function, power on the monitor while holding down the RESET switch. When the self test mode is activated, IC531(DAC) is controlled by IC801(MPU) to generate the voltage which makes IC501 to oscillate at 61.5KHz. Thus the horizontal deflection circuit and the high voltage circuit operate at this frequency. The pseudo vertical sync signal count down from the horizontal sync signal with IC5L1 and the shaped AFC pulse are fed to IC791, IC5L1 and IC7A1, the clamp pulse for IC711 is generated by IC7A1. The video signal is generated by IC791, and fed to IC721(Output amp) via IC711(PRE-AMP).

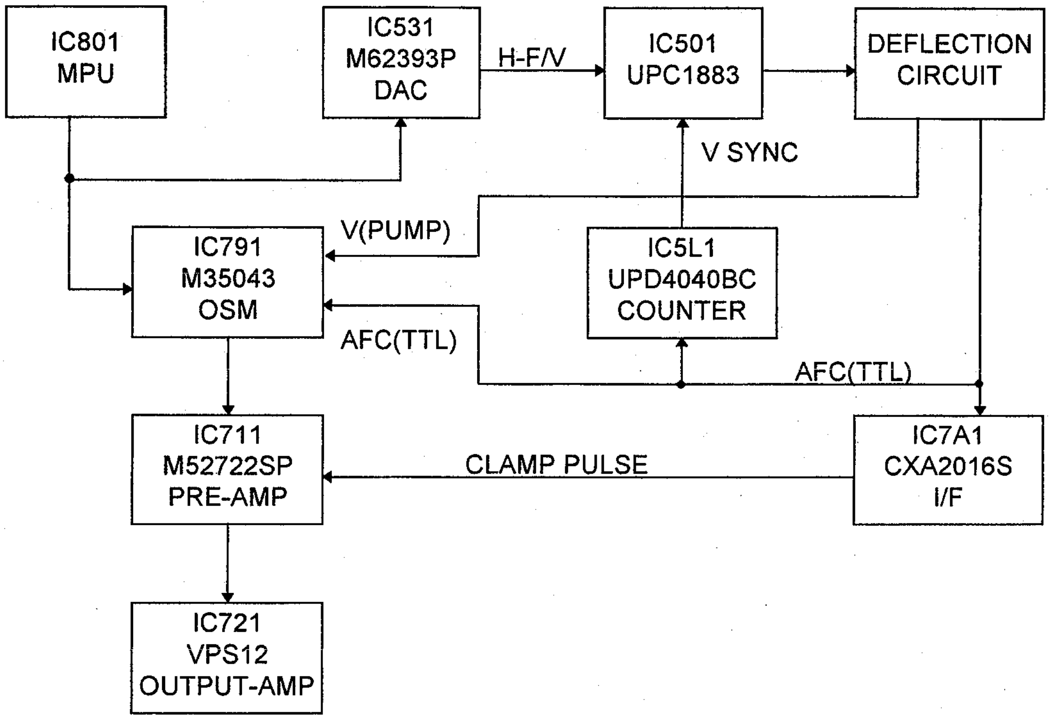

IC801
MPU
IC531
M62393P
DAC
H-F/V
IC501
UPC1883
DEFLECTION
CIRCUIT
V SYNC
V(PUMP)
IC791
M35043
OSM
IC5L1
UPD4040BC
COUNTER
AFC(TTL)
AFC(TTL)
IC711
M52722SP
PRE-AMP
CLAMP PULSE
IC7A1
CXA2016S
I/F
IC721
VPS12
OUTPUT-AMP

Fig. 1.5 Self Test

2. DEFLECTION CIRCUITS

2-1. HORIZONTAL DEFLECTION CIRCUIT

1) Horizontal Oscillation Circuit

The control of the horizontal oscillation and horizontal image position is done by IC501 on the OSC PWB (PWE-470A).

The IC501 controls the following circuits as its internal functions.

- 1st delay circuit
- H-width circuit
- F/V delay circuit
- FBP delay circuit
- AFC circuit
- Horizontal duty control circuit
- Horizontal oscillation circuit (H-OSC)
- Horizontal Image Phase Shifter Circuit

① 1st delay circuit

The horizontal sync signal output from IC7A1 pin 18 on the VIDEO PWB is fed to pin 26 of IC501.

The horizontal sync signal input from pin 26 is delayed by this circuit.

The output signal delay is controlled by the input voltage of pin 25.

② H-width circuit

The output signal of 1st delay is converted to the fixed pulse width signal (the Horizontal dummy sync signal) by this circuit.

The duty cycle of the pulse is fixed to 10%.

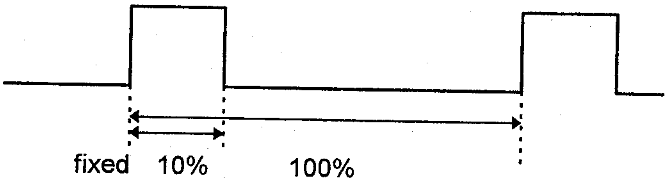


Fig. 2.1

③ F/V delay circuit

This circuit is an VCO(Voltage Control Oscillator).

An oscillator frequency is controlled by the input voltage of pin 19.

The control characteristic of the input voltage of pin 19 vs. an oscillator frequency is Fig. 2-2.

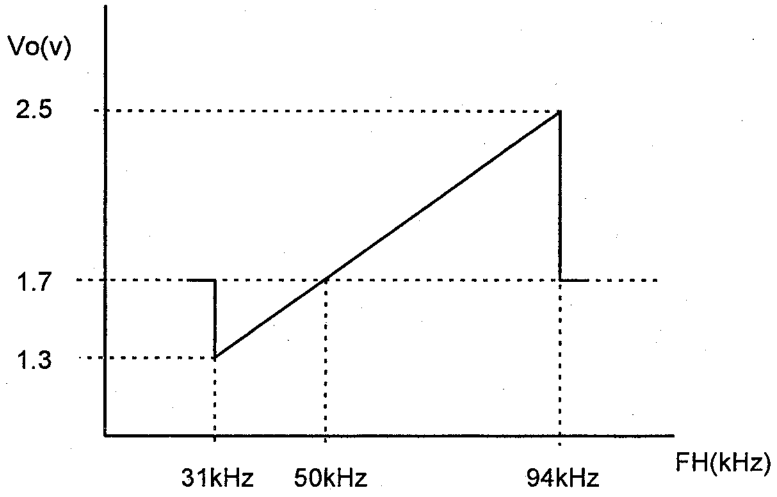


Fig. 2.2

.FBP delay circuit

The FBP pulse input from pin 17 is delayed by this circuit and then it is supplied to AFC circuit.

The duty cycle of the FBP pulse is fixed to 30%.

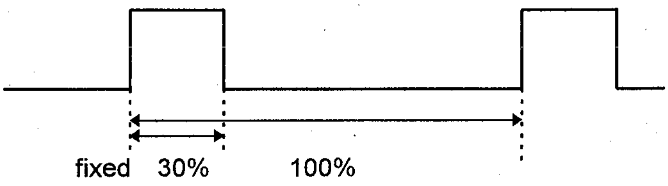


Fig. 2.3

.AFC circuit

The AFC circuit detects the phase error between the horizontal dummy sync signal and FBP pulse input from pin 17 and uses this error voltage to control the horizontal oscillation.

.Horizontal duty control circuit

The horizontal drive pulse is output from pin 18 and then supplied to the horizontal drive circuit.

The duty of horizontal drive pulse is controlled by the voltage of pin 23 to make the ratio approximately 48% regardless of the oscillation frequency.

.Horizontal oscillation circuit (H-OSC)

The horizontal sync signal output from of IC7A1 pin 18 on the VIDEO PWB is fed to IC501 pin 26 on SUB PWB. Horizontal oscillation frequency is determined by the voltage applied to pin 19 and the current flowing out of pin 20.

The pulse (appox. 8Vp-p) at the pin which its frequency is same as that of input sync signal, is output and applied to horizontal drive circuit. The duty cycle of the output pulse is regulated to approx. 48% by the voltage applied to pin 23.

.Horizontal Image Phase Shifter Circuit

The horizontal position of the picture is controlled by horizontal sync signal in which the 1st delay output signal is generated by charging and discharging the internal capacitor and FBP input and FBP delay output wave form is generated by charging and discharging the internal capacitor. Therefore by varying the 1st delay quantity with the DC voltage applied to pin 25, the position of the picture is controlled.

④ Distortion Correction Circuit

.Side Pincushion and Vertical Trapezoid Distortion Correction Circuit

The parabolic wave form that is the side pincushion and trapezoid distortion correction wave form output from IC501 pin 10 is supplied to the horizontal size control circuit on the MAIN PWB. Its amplitude is controlled by side pincushion distortion correction, control voltage input to pin 3, and its bias is controlled by vertical trapezoid distortion control voltage input to pin 2 of IC501.

.Parallelogram Distortion Correction Circuit

The saw tooth wave form output from IC501 pin 28 is controlled by DC voltage input to pin 4. Parallelogram distortion is corrected by this wave form input to pin 25(1st delay terminal) through C522. When DC voltage input to pin 4 is approximately 2.5V, corrective value is 0V.

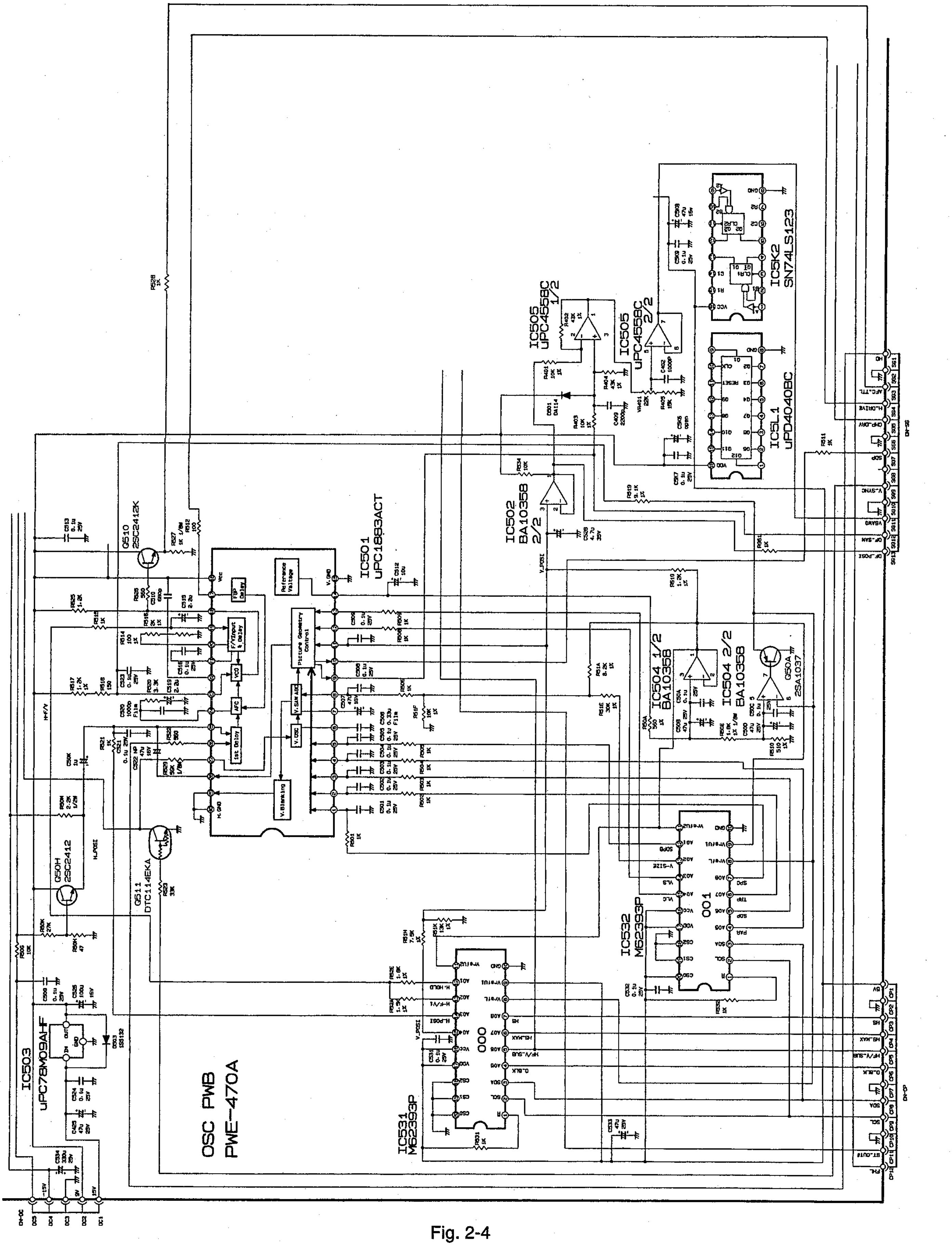
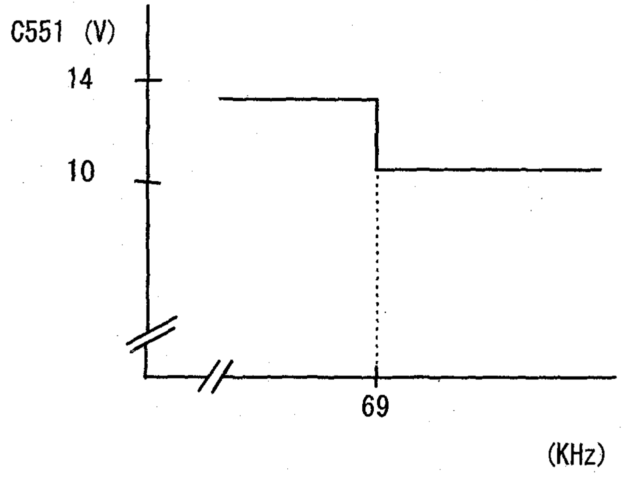

OSC PWB
PWE-470A
IC503
uPC78M09AHF
IC531
M62393P
000
IC532
M62393P
001
IC501
UPC1883ACT
Q510
2SC2412K
Q511
DTC114EKA
Q50H
2SC2412
IC502
BA10358
2/2
IC504 1/2
BA10358
IC504 2/2
BA10358
Q50A
2SA1037
IC505
UPC4558C
1/2
IC505
UPC4558C
2/2
IC5L1
UPD4040BC
IC5K2
SN74LS123
Picture Geometry Control
Reference Voltage
V.Blanking
V.OSC
V.SAW AGC
1st Delay
AFC
VCO
F/V Input & Delay
FBP Delay
H-F/V
H_POSI
V_POSI
CN-OC
CN-CP
CN-SS

Fig. 2-4

2) Horizontal Drive Circuit

The horizontal drive system uses what is generally referred to as a flyback system.
The horizontal drive pulse output from IC501 pin 18 on the OSC PWB switches Q553 on and off.
It is amplified by T551 and switches Q554 (the horizontal output transistor) on and off. The voltage of C551 for horizontal drive changes by the horizontal frequency as shown below and sets the optimum drive condition.



3) Horizontal Deflection Output Circuit

It corrects the optimum horizontal linearity by using Linear-coil and S correction capacitor to change the horizontal frequency mode. Horizontal frequency mode is shown in CPU CIRCUIT description section. Linear-coil of L581 changes over at threshold of 49KHz. When operation frequency is higher than 49KHz, the Linear-coil of 4-5 pin switches on and 1-2 pin switches off. On the other hand, if it is lower than 49KHz, the Linear-coil of 4-5 pin switches off and 1-2 pin switches on.

4) Horizontal Size Control Circuit

Using the PWM method to control the horizontal deflection frequency, horizontal size is controlled by DC-DC conversion of the power supply voltage for the horizontal deflection. There are two types of horizontal size control. One is the H-SIZE for users, the other is the H-SIZE MAX used at the time of factory setting.

With the horizontal size control used by the user, the horizontal video size is set so that the image spreads across the entire front bezel (398mm) at all of the preset timing signals.
The horizontal size control consists of the following circuits;

PLL and drive pulse generator
Saw-tooth wave generator
Switching pulse generator
switching FET drive circuit
Duty cycle controller

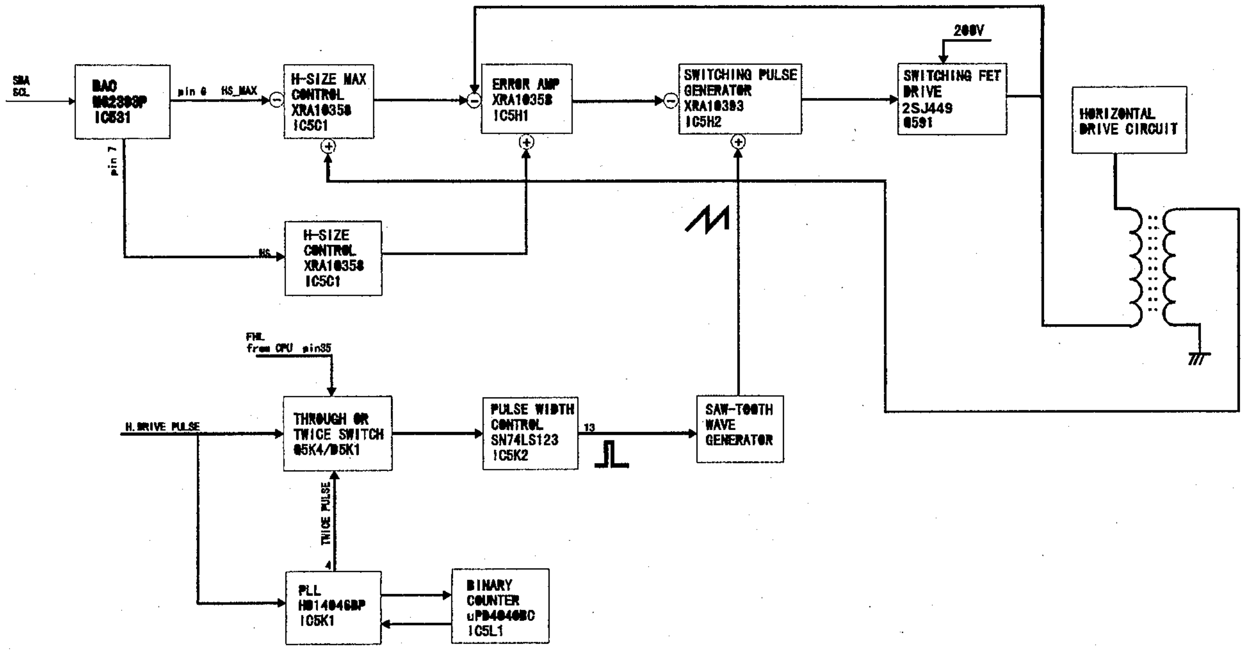

SDA
SCL
DAC
M62393P
IC531
pin 6
HS_MAX
pin 7
H-SIZE MAX CONTROL
XRA10358
IC5C1
HS
H-SIZE CONTROL
XRA10358
IC5C1
ERROR AMP
XRA10358
IC5H1
SWITCHING PULSE GENERATOR
XRA10393
IC5H2
200V
SWITCHING FET DRIVE
2SJ449
Q591
HORIZONTAL DRIVE CIRCUIT
FHL
from CPU pin35
H.DRIVE PULSE
THROUGH OR TWICE SWITCH
Q5K4/D5K1
PULSE WIDTH CONTROL
SN74LS123
IC5K2
13
SAW-TOOTH WAVE GENERATOR
TWICE PULSE
4
PLL
HD14046BP
IC5K1
BINARY COUNTER
uPD4040BC
IC5L1

Fig. 2.5 HORIZONTAL SIZE CONTROL CIRCUIT

Drive pulse frequency for saw-tooth wave is twice the horizontal frequency when the horizontal frequency operates from 31KHz to 49KHz. When it operates higher than 49KHz, drive pulse frequency for saw-tooth wave synchronizes with the horizontal frequency. Using the PLL method (IC5K1), output pulse of IC5K1 pin 4 is made to twice the frequency which is input to pin 14 (deflection drive pulse). Output frequency of IC5K1 pin 14 controls the voltage of IC502 pin 7 which converts the horizontal frequency to correct voltage. The voltage at IC801 pin 35 determines to double the frequency or not. When the horizontal frequency is lower than 49KHz, voltage of IC801 pin 35 outputs 0 volt and drive pulse frequency is doubled by D5K1 on OSC PWB. When it is higher than 49KHz, voltage of IC801 pin 35 outputs 5 volts and drive pulse frequency is made same as horizontal frequency by Q5K4.

The saw-tooth wave generator consists of Q5H2 and Q5H1 which are switched by drive pulses. The slope of saw-tooth waveform is decided by charging current on C5H1, and input to IC5H2 of pin 5. Also the voltage which controls the horizontal size is input to IC5H2 pin 6. By comparing these two voltages, square wave is output from pin 7. The square wave is amplified and input to the gate of Q591, and converts source voltage to voltage for horizontal deflection that is proportional to the duty cycle of gate input square wave. The voltage is supplied to T561.

* User H SIZE control

OSM control for users vary from 0 to 255. At this time, the voltage of IC531 pin 7 (HS control line) vary from 5V to 0.88V, and the voltage of IC5H1 pin 5 vary from approximately 3V to 4V. The duty cycle of IC5H2 pin 7 output square wave which is input to error amplifier IC5H1 pin 5 changes and the horizontal size varies. The horizontal video size reduces as much as approximately 77% irrespective of the horizontal frequency when the maximum size is taken to 100%.

* H SIZE MAX control

The H SIZE MAX control is accessible in service mode only, and this control sets the maximum horizontal size. The H SIZE for user control vary from the horizontal maximum size which is adjusted at this stage to less than the H SIZE MAX. H SIZE MAX control vary from 0 to 255 on OSM menu, and the voltage of IC531 pin 6 output voltage vary from approximately 0.88V to 5V. The horizontal maximum size control voltage (VCAO) is output to IC5C1 pin 13 and is compared to the corrected AFC pulse voltage (IC5C1 pin 12) . The VCAO output voltage is converted to slice voltage at the comparator for PWM control which is input to error amplifier IC5H1 pin 6.

5) Distortion Correction Circuit

The distortion correction circuit creates a distortion correction signal to reduce the geometric distortion intrinsic in the CRT, and this signal is modulated by the phase and deflection circuit. The correction wave is generated inside IC501 ; uPC1883 on the OSC PWB. The distortion correction wave is roughly divided into horizontal size and horizontal phase circuit.

* Horizontal Size correction Circuit

1) Side pin correction (SDP)
2) Trapezoid correction (TRP)
3) Corner distortion correction (CORNER)

When the user performs the OSM menu of geometric horizontal frequency system correction, the input voltage of IC501 pin 3, pin 2, and pin 1 vary the a range of 1V to 4V. After computation inside the IC, the correction wave of the computation results is output to pin 10 SDP. Then this waveform amplitude is controlled by sub H_F/V which converts the horizontal frequency to voltage controlling the horizontal size at output of op-amp inside IC4A1. This control is performed in the multiplier (IC4A1). The output amplitude of IC4A1 pin 6 is half as much as multiple pin 5 SDP by pin 4 voltage. Following this output is added to the horizontal chopper duty control section, and finally it is modulated to the power supply voltage used for horizontal deflection and applied to the raster correction.

* Horizontal Phase correction Circuit

1) Side pin balance correction (SDPB)
2) Parallelogram correction (PAR)

Similarly, when the user performs the geometric horizontal phase system correction, the input voltage of IC501 pin 5 (SDPB) and pin 4 (PAR) varies in a range of 1V to 4V. Inside the IC, the correction wave of the computation results is output to pin 28 (HPDO). The correction wave is added to the DC voltage of pin 25 (HP), and phase correction using the IC501 horizontal delay function is performed.

6) Rotation Correction Circuit

Raster rotation is corrected by moving the electron beam in the magnetic field produced by current applied to the Z-coil. The amount of correction is proportional to the current applied to the Z-coil and the correction can be adjusted with the control voltage (DC) of the D/A converter. The DC voltage output from IC961(D/A converter) pin 4 generates current to flow in the Z coil, and amount of rotation is determined. User can adjust the level of rotation by operating OSM menu(Rotate).

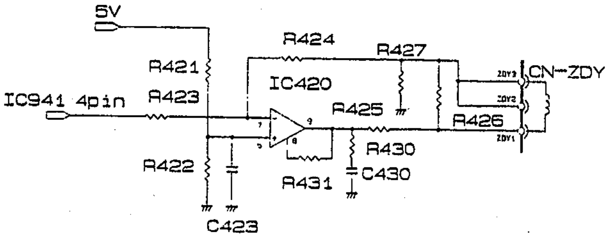


Fig. 2.6 Rotation Correction Circuit

7) H Centering Circuit

Switching regulator generates the floating 5 volts which is compared to the deflection circuit power supply voltage (high B+ voltage). This voltage is divided by VR581 (H centering) and is supplied to the base of Q584. The voltage differences of Q584's base and emitters is supplied to L583. Horizontal centering is manipulated by the current supplied by L583 to the horizontal deflection circuit.

2-2. VERTICAL DEFLECTION CIRCUIT

The vertical deflection circuit consists of the following blocks:

1) Sawtooth Wave Form Generating and Wave Form Corrective Circuits
2) Vertical Raster Position Control Circuit
3) Vertical Output Amplifier Circuit

1) Sawtooth Wave Form Generating and Wave Form Corrective Circuits

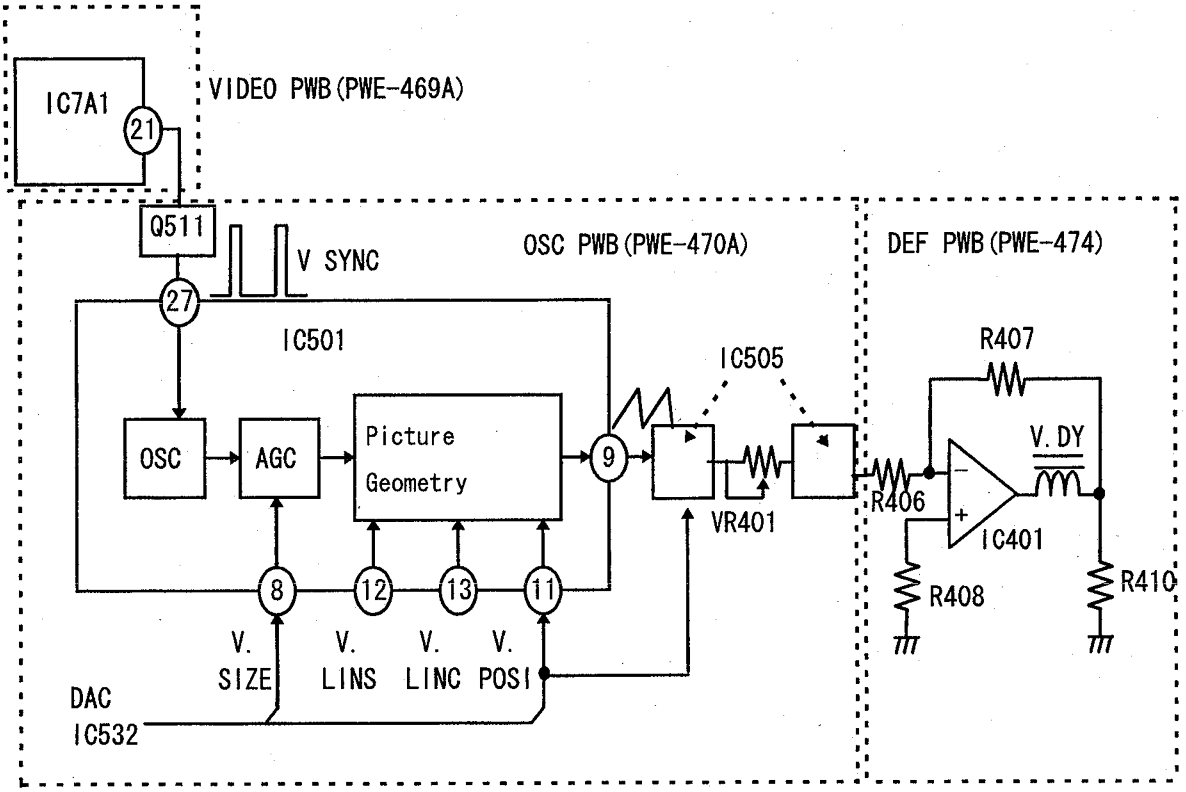
The vertical sync signal from IC7A1 on VIDEO PWB (PWE-469A) is fed to IC501 pin 27 (uPC1883ACT) on OSC PWB (PWE-470A), so that the sawtooth wave form synchronized with the input signal is output from IC501 pin 9. The amplitude of sawtooth wave form is controlled by the voltage at IC501 pin 8. IC501 controls the amplitude which is constant and independent of frequency. In addition, the output sawtooth wave form of IC501 is corrected for vertical linearity. In IC501, square wave form and square wave form are added to sawtooth wave form to correct linearity. The amount of correction is controlled by the voltage applied to pins 8, 11, 12 and 13 (vertical size pin 8, vertical position pin 11, S correction pin 12 and C correction pin 13). The voltage at pins 12, 13 are D/A converter outputs. As result, the optimum linearity can be obtained even as the vertical size and vertical position are changed.

2) Vertical Raster Position Control Circuit

The vertical raster position is controlled by changing the amount of DC bias of the input signal to IC401. IC505 subtracts the voltage at IC501 pin 11(vertical position voltage) from the voltage at IC501 pin 9 (sawtooth wave form output), and the amount of DC bias of the input signal to IC401 is changed.

3) Vertical Output Amplifier Circuit

The current proportional to the input voltage to IC401 is supplied to the vertical deflection coil (V-DY). The vertical deflection current is taken as voltage wave form on R410 and fed back to IC401.



IC7A1
21
VIDEO PWB(PWE-469A)
Q511
V SYNC
OSC PWB(PWE-470A)
DEF PWB(PWE-474)
27
IC501
IC505
R407
OSC
AGC
Picture
Geometry
9
VR401
R406
V.DY
IC401
R408
R410
8
12
13
11
V.
SIZE
V.
LINS
V.
LINC
V.
POSI
DAC
IC532

Fig. 2.7 Vertical Deflection Circuit

3. HIGH VOLTAGE CIRCUIT

The high voltage circuit consists of the high voltage control circuit, Q5P1, and its peripheral circuits which are made up of high voltage output circuit and the high voltage protection circuit for in case of high voltage circuit irregular operation.

1) High Voltage Control Circuit

ICD5P1 is high voltage control integrated circuit.
The high voltage detection voltage is output to TP-HV from the FBT's internal bleeder resistor.
The AFC pulse output from the horizontal output transformer (T561) is input to 4 pin of ICD5P1, and the sawtooth wave is generated in ICD5P1. This sawtooth wave is compared with the high voltage detection voltage and the drive pulse applied to the gate of Q5P1 is generated. This pulse width becomes narrower when the high voltage rises, and becomes wider when high voltage drops.

2) High Voltage Output Circuit

The output circuit operates depending on the drive pulse applied to the gate of Q5P1, and the fly-back pulse is produced at pin 1 of T5R1 (FBT) . The drive pulse width changes with respect to the high voltage fluctuation resulting from changes in the CRT beam current and operation frequency, are the peak value of the corrector pulse changes in which and high voltage stabilization is performed.

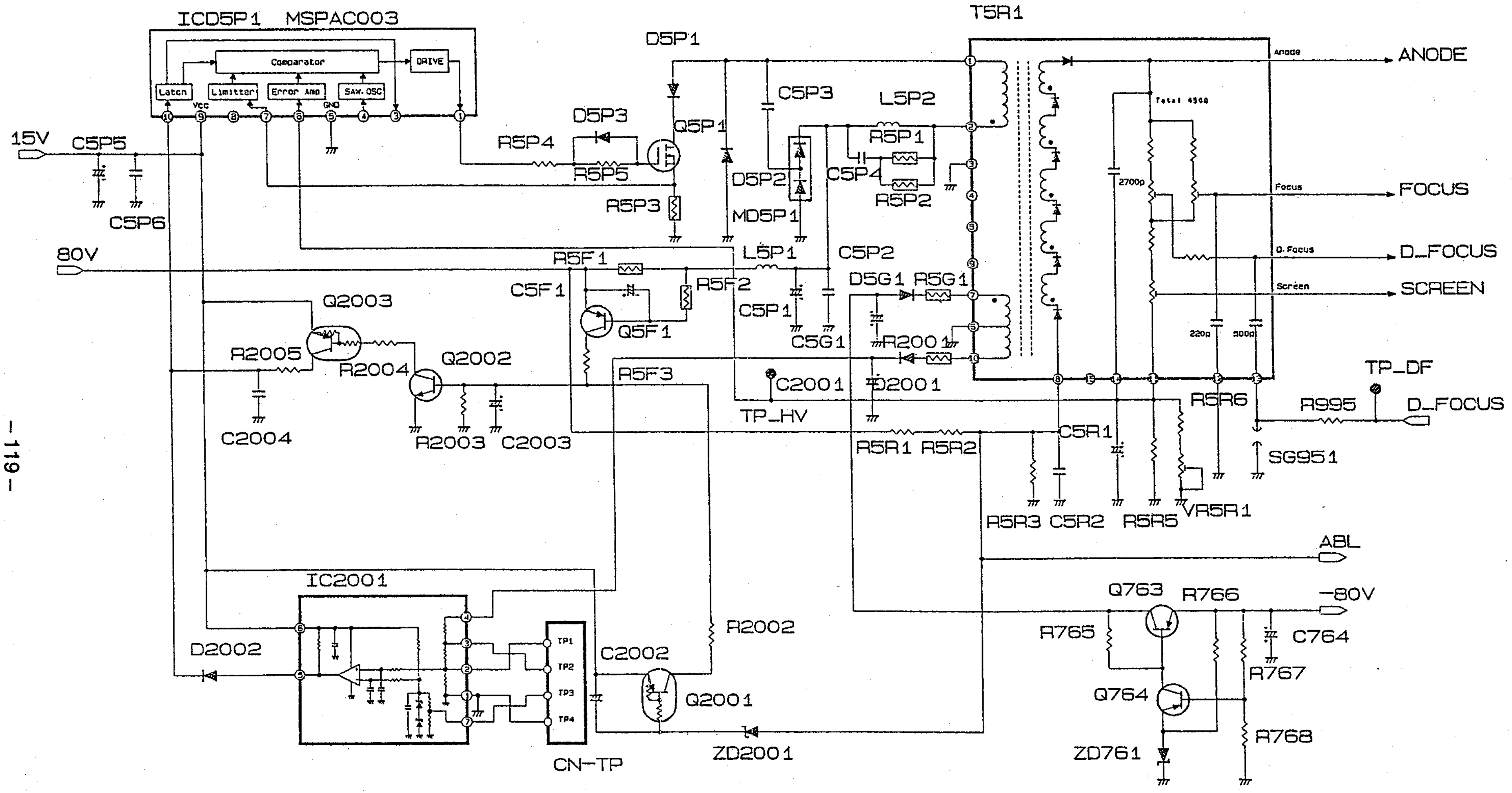
3) High Voltage Protector Circuit

This circuit consists of the X-ray protector which stops the operation of the control circuit when the high voltage rises abnormally, and the overcurrent protector which operates when the current flowing into FBT (T5R1) has increased. Once the X-ray protector or the over current protector are activated, their operation is not canceled unless the power supply is switched off, and then on again.

*X-ray protector
When the high voltage rises, the voltage of T5R1 (FBT) pin 10 rises. This voltage is compared with the reference voltage in IC2001, and when the pin 10 voltage exceeds the reference voltage, the comparator output voltage at IC2001 (5 pin) become high. At this point, operation of the high voltage control circuit is stopped.

*Overcurrent Protector
When the current flowing into T5R1 (FBT) pin 2 increases, Q5F1 operates and Q2002 is switched on, and when the current flowing into T5R1 (FBT) pin 8 increases, Q2001 operates and Q2002 is switched on. When Q2002 is switched on, Q2003 is also switched on and the voltage of ICD5P1 10 pin rises.
Then latch circuit inside ICD5P1 operates and the high voltage control circuit operation is stopped.
While the protector circuit is operating, the voltage of ICD5P1 pin 3 is approx. 2V.

HIGH VOLTAGE CIRCUIT AND PROTECTOR CIRCUIT


ICD5P1 MSPAC003
Comparator
DRIVE
Latch
Limitter
Error Amp
SAW. OSC
Vcc
GND
15V
C5P5
C5P6
80V
D5P1
D5P3
R5P4
R5P5
Q5P1
R5P3
C5P3
D5P2
MD5P1
L5P2
R5P1
C5P4
R5P2
L5P1
C5P2
C5P1
C5G1
R5F1
R5F2
C5F1
Q5F1
R5F3
D5G1
R5G1
R2001
D2001
C2001
TP_HV
Q2003
R2005
R2004
Q2002
C2004
R2003
C2003
T5R1
Anode
ANODE
Total 450M
2700p
Focus
FOCUS
D. Focus
D_FOCUS
Screen
SCREEN
220p
500p
R5R6
R995
TP_DF
D_FOCUS
SG951
C5R1
R5R1
R5R2
R5R3
C5R2
R5R5
VR5R1
ABL
-80V
Q763
R766
R765
C764
R767
Q764
R768
ZD761
IC2001
D2002
TP1
TP2
TP3
TP4
CN-TP
C2002
Q2001
R2002
ZD2001

4. BLANKING CIRCUIT

The blanking circuit consists of Q461 through Q464 which combine the horizontal and vertical blanking pulse, the (sub bias) circuit which controls the DC voltage of G1, and the spot killer circuit.

1) Blanking Circuit

The horizontal blanking pulse is applied from the horizontal output transformer's AFC pulse. The vertical blanking pulses are generated by IC7A1 and pump-up pulse of vertical deflection circuit. The horizontal blanking pulse and the vertical blanking pulses are combined with Q461, Q464 and Q465, via Q462 and Q463, and are applied to G1. Therefore during the horizontal and vertical retrace periods, the voltage of G1 becomes low and the raster is blanked.

2) Sub Bias Circuit

Control of the sub bias voltage is performed by the output of IC752(DAC). IC771 and Q471 are voltage and current conversion circuits, and when the voltage of IC752 pin 4 changes, the current to the collector of Q471 changes. The voltage drop occurring at the resistor R476 is used to vary the DC voltage applied to G1.

3) Spot Killer Circuit

The spot killer circuit operates when the display is turned off and during suspend and off modes. When the power is on, Q781 is turned off by the 9.4VDC of C781 and the voltage of C781 is 135V. When the display is turn off. The Q781 is activated by the voltage of 9.4V power supply drop. Therefore Q782 is activated by the electric charge through R783 from C781. When the display goes to suspend or off mode, Q783 is turned off by IC731 and Q782 turns on. At this point, the G1 voltage is changed to -135V by the polarity change of C782 "+" charged voltage. The raster is cut off.

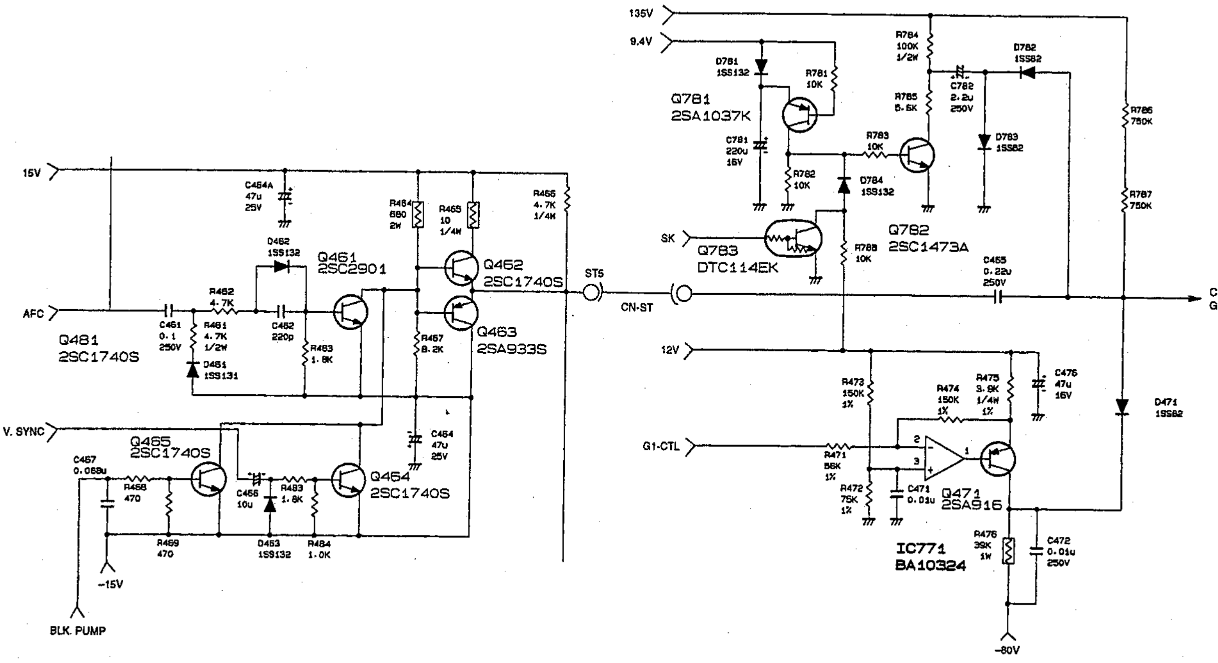

135V
9.4V
D781 1SS132
R781 10K
Q781 2SA1037K
C781 220u 16V
R782 10K
R784 100K 1/2W
R785 5.6K
C782 2.2u 250V
D782 1SS82
R783 10K
D783 1SS82
D784 1SS132
R786 750K
R787 750K
SK
Q783 DTC114EK
R788 10K
Q782 2SC1473A
C465 0.22u 250V
CRT G1
CN-ST
ST5
12V
R473 150K 1%
R474 150K 1%
R475 3.9K 1/4W 1%
C476 47u 16V
D471 1SS82
G1-CTL
R471 56K 1%
R472 75K 1%
C471 0.01u
Q471 2SA916
IC771 BA10324
R476 39K 1W
C472 0.01u 250V
-80V
15V
C464A 47u 25V
R464 680 2W
R465 10 1/4W
R466 4.7K 1/4W
D462 1SS132
Q461 2SC2901
Q462 2SC1740S
Q463 2SA933S
AFC
R462 4.7K
C461 0.1 250V
R461 4.7K 1/2W
C462 220p
R463 1.8K
R467 8.2K
D461 1SS131
Q481 2SC1740S
V. SYNC
Q465 2SC1740S
C467 0.068u
R468 470
R469 470
C466 10u
R483 1.8K
D463 1SS132
R484 1.0K
C464 47u 25V
Q464 2SC1740S
-15V
BLK. PUMP

Fig. 4.1 Blanking Circuit

5. DYNAMIC FOCUS CIRCUIT

The dynamic focus section is made up of three areas :
The dynamic focus (D-FOCUS) IC (IC951) has the function of generating the horizontal/vertical parabolic wave as well as controlling the gain, the output amplifier, and the coupling circuit.

1) Horizontal Parabolic Wave Generation and Gain Control Circuit

The AFC pulse which is generated by the FBP(fly back pulse) of the secondary winding of the horizontal output transformer(T561) is shaped and input to IC951 17 pin(AFC_TTL). This pulse is used as a trigger and sawtooth wave is generated at the sawtooth oscillator section in IC951. The sawtooth wave is converted to a parabolic wave at the X`2 circuit and the parabolic wave gain is adjusted with the pin 6 input voltage(H_DF). To set the peak voltage of this parabolic to an optimum amplitude with respect to the horizontal frequency and horizontal size, tracking is done at the pin 19 input voltage (SUB_H_DF), i.e., the horizontal dynamic focus voltage. The final horizontal parabolic wave is output from pin 7.

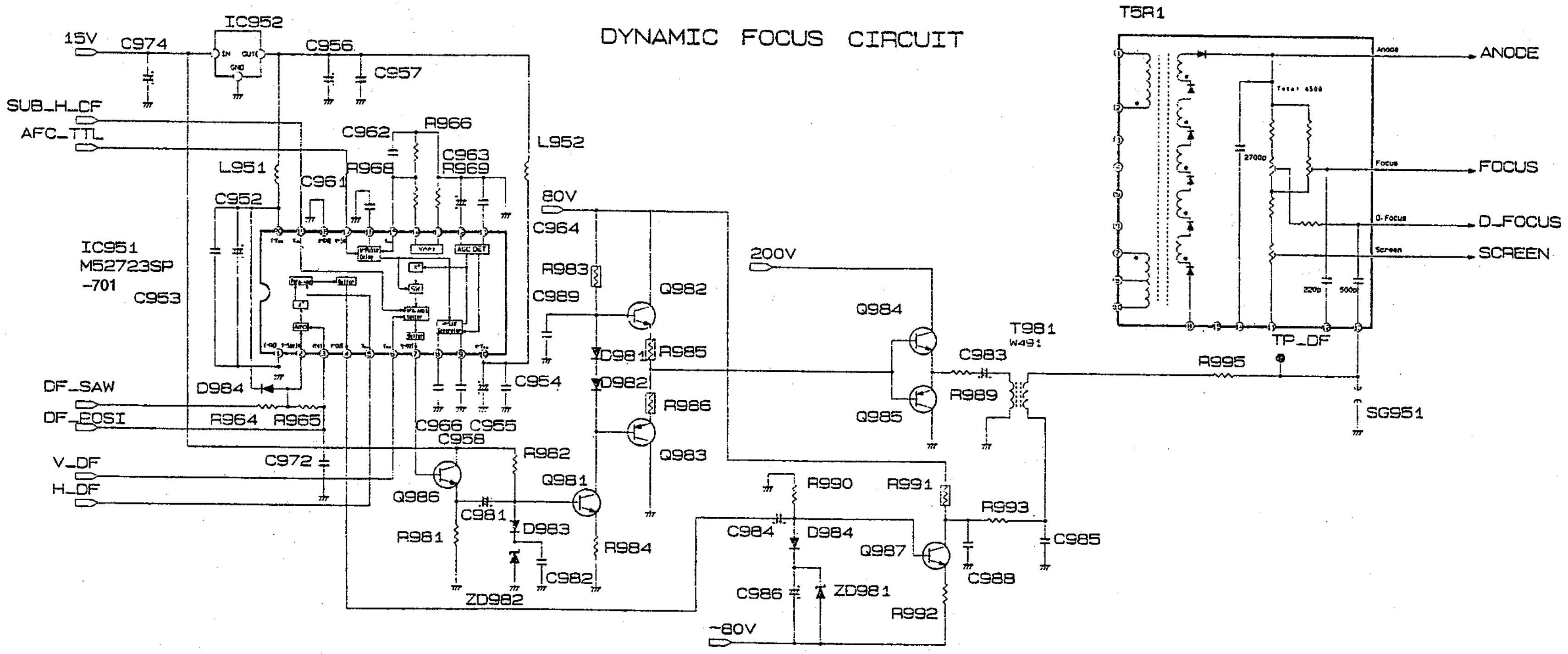
2) Vertical Parabolic Wave Generation and Gain Control Circuit

The vertical sawtooth wave produced by the oscillator IC (IC501) is input to IC951 pin 2 (DF_SAW) and is converted to a parabolic wave in the X`2 circuit in IC951. The gain of this parabolic wave is controlled by the pin 5 input voltage(V_DF), i.e.,the vertical dynamic focus voltage. The result is output to pin 4.

3) Output Amplifier Circuit and Coupling Circuit

The horizontal and vertical parabola waveforms are generated at IC951 and are clamped before each output circuit for wide dynamic range of the output circuit. The clamp voltage is determined by the voltages of ZD981 and ZD982. The horizontal parabola waveform is amplified by Q981. The output waveform at Q981 is input to T981 via the buffer circuit which is comprised of Q982, Q983, Q984 and Q985. The gain of T981 is approximately 8. The vertical parabola waveform is amplified by Q987. The output waveform at Q987 modulates the secondary winding of T981 as the vertical parabola waveform and the T981 outputs the horizontal parabola waveform which is modulated by the vertical waveform. This modulated waveform is input to the CRT focus grid via the built-in capacitor of T5R1(FBT).

DYNAMIC FOCUS CIRCUIT


15V
C974
IC952
IN
OUT
GND
C956
C957
SUB_H_CF
AFC_TTL
L951
C952
C961
C962
R966
R968
C963
R969
L952
IC951
M52723SP
-701
C953
80V
C964
R983
C989
Q982
D981
R985
D982
R986
Q983
C954
C966
C955
C958
DF_SAW
D984
DF_POSI
R964
R965
C972
V_DF
H_DF
Q986
R962
Q981
C981
D983
R981
C982
ZD982
R984
200V
Q984
Q985
C983
R989
T981
W491
R990
R991
R993
C984
D984
Q987
C985
C988
C986
ZD981
R992
~80V
T5R1
Anode
ANODE
Total 4500
Focus
FOCUS
D-Focus
D_FOCUS
Screen
SCREEN
2700p
220p
500p
R995
TP_DF
SG951

6. CPU CIRCUIT

1) CPU

IC801 : 8 bit CPU / CMOS IC
IC802 : EEPROM / CMOS IC

This system has the following functions.

- Frequency Counter
- fH band
- Degaussing Control
- DAC control (see 2. DC Control Circuit)
- PMS control (see 3. Power Management system (PMS) Circuit)
- OSD control (see 5. User Control Operation)

a. Frequency Counter

IC801 counts Horizontal frequency by event counter, Vertical frequency by interval timer. Horizontal sync is negative input to IC801 pin 12. Vertical sync is positive input to IC801 pin 44.

Sync range

Horizontal	31.0 - 94.0 kHz
Vertical	55.0 - 160 Hz

If Horizontal frequency is less than 1 kHz or Vertical frequency is less than 10 Hz, IC801 judges "NO PULSE". And IC801 enters to "PMS MODE".

b. Fh Band

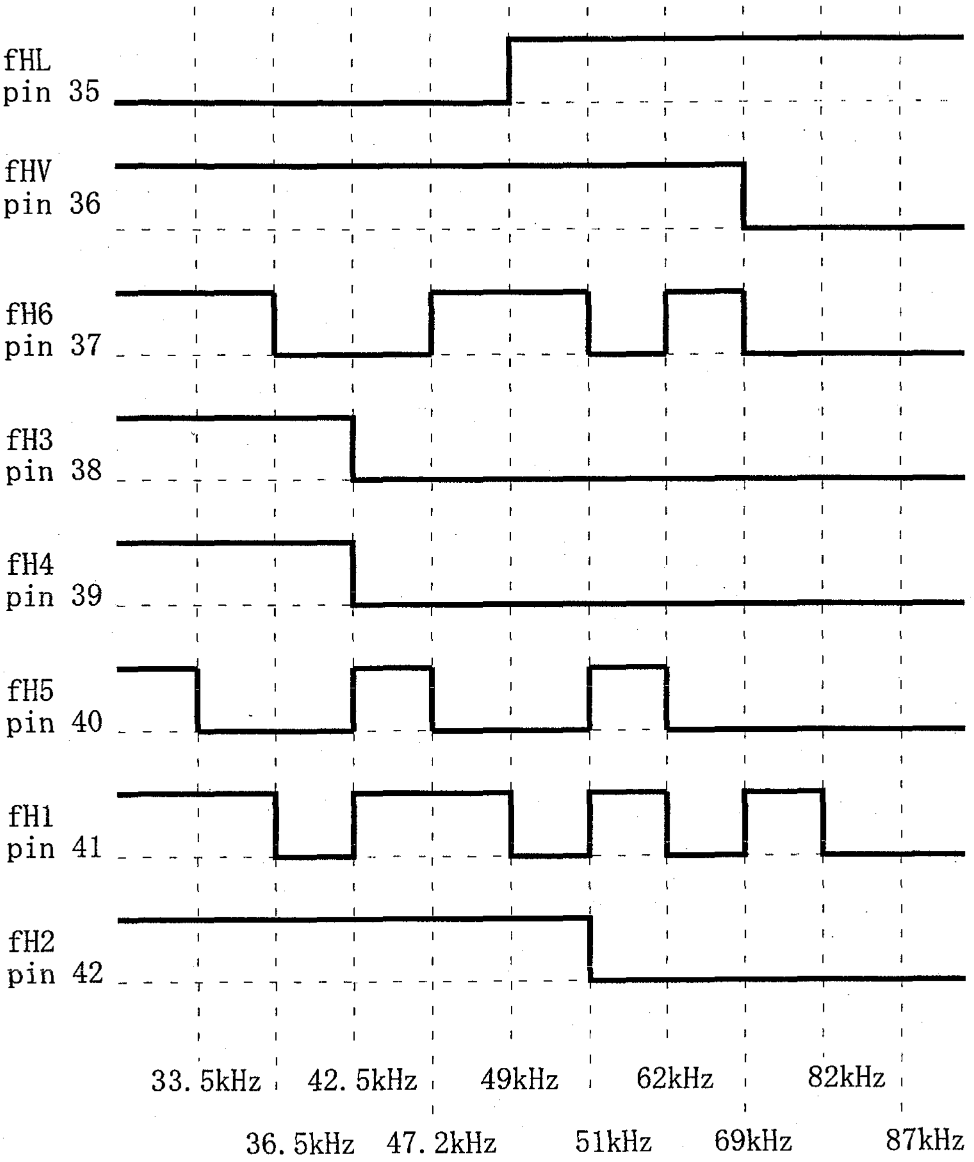

fHL
pin 35
fHV
pin 36
fH6
pin 37
fH3
pin 38
fH4
pin 39
fH5
pin 40
fH1
pin 41
fH2
pin 42
33. 5kHz
42. 5kHz
49kHz
62kHz
82kHz
36. 5kHz
47. 2kHz
51kHz
69kHz
87kHz

Fig. 6.1 Output fh Band status (IC801)

Attention : Fh 1 to 6 Band signals are output for horizontal output circuit control to keep the horizontal linearity constant. Fh V signal is output for horizontal out put circuit control to keep the drive condition and for SW reg. circuit control output to keep the output voltage constant. Fh L signal is output for horizontal output circuit control to keep the horizontal linearity constant and output for video clamp circuit control to switch the clamp pulse width.

c. Degaussing Control

Manual degaussing signal. IC801 pin 61 becomes High for 3 seconds when user presses the "PROCEED" switch while "DEGAUSS" (MENU(u) - "BRIGHTNESS & CONTRAST") is highlighted, or the monitor is powered on. DAC - "TILT" data value is set to center, while degaussing. This pin will be LOW in normal condition.

2) DC Control Circuit

CPU (IC801) controls five DAC ICs (IC531, IC532, IC731, IC752, IC961) through I^{2}C BUS. Its analog outputs control DAC output so that the analog voltage corresponds to the DC control data from CPU. CPU controls two MDAC (IC703, IC753) through Serial Bus. Its analog outputs control MDAC output so that the analog voltage corresponds to the DC control data from CPU and analog voltage to pin 1, 3 and 12. IC802 is an EEPROM which stores the DC control data for preset graphics standard timings.

Table 1 Summary of DAC control (IC531 on OSC PWB: CS0=CS1=CS2=0)

PORT	NAME	Summary
A01	H_HOLD	Horizontal free-run frequency adjustment
A02	H_F/VI	Horizontal frequency versus voltage adjustment
A03	H_POSI	Horizontal position adjustment
A04	VPOSI	Vertical position adjustment
A05	HSMUTE	Horizontal size protector when switch the ambient condition
A06	SUBHF/V	Horizontal frequency against voltage adjustment (sub)
A07	HSMAX	Horizontal maximum size adjustment
A08	H_SIZE	Horizontal size adjustment

Table 2 Summary of DAC control (IC532 on OSC PWB: CS0=1 CS1=CS2=0)

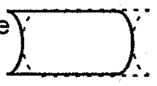
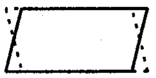
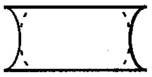
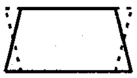
PORT	NAME	Summary
A01	SDPB	Side Pin Balance adjustment 
A02	V_SIZE	Vertical size adjustment
A03	VLS	Vertical linearity balance adjustment (center - top/bottom)
A04	VLC	Vertical linearity balance adjustment (top - bottom)
A05	PAR	Parallelogram adjustment 
A06	SDP	Side Pin adjustment 
A07	TRP	Trapezoid adjustment 
A08	CORNER	Corner distortion adjustment

Table 3 Summary of DAC control (IC731 on CRT PWB: CS0=CS1=1 CS2=1)

PORT	NAME	Summary
A01	OSD ADJ	OSD brightness adjustment
A02	R GAIN	Video R swing voltage adjustment
A03	G GAIN	Video G swing voltage adjustment
A04	B GAIN	Video B swing voltage adjustment
A05	CONTRAST	User CONTRAST control
A06	BRIGHT	User BRIGHTNESS control
A07	CUT_OFF	Switch the CUT OFF mode
A08	SPOTKILL	Spot killer circuit control

Table 4 Summary of DAC control (IC752 on CRT PWB: CS0=1 CS1=0 CS2=1)

PORT	NAME	Summary
A01	G_BIAS	Back raster color balance adjustment
A02	G_SBRT	Brightness tracking adjustment
A03	R_BIAS	Back raster color balance adjustment
A04	R_SBRT	Brightness tracking adjustment
A05	G1C	Back raster brightness adjustment
A06		
A07	B_BIAS	Back raster color balance adjustment
A08	B_SBRT	Brightness tracking adjustment

Table 5 Summary of DAC control (IC961 on DF PWB: CS0=0 CS1=1 CS2=0)

PORT	NAME	Summary
A01	HDF	Horizontal Dynamic Focus adjustment
A02	VDF	Vertical Dynamic Focus adjustment
A03	SUB_HDF	Horizontal Dynamic Focus control
A04	MOIRE	Moire Canceller level adjustment
A05	TLT	Display tilt (raster rotation) adjustment
A06	EMF	Earth Magnetic Field Correction
A07	H-CONV	Horizontal Static Convergence Adjustment
A08	V-CONV	Vertical Static Convergence Adjustment

Table 6 Summary of MDAC control (IC703 on VIDEO PWB)

PORT	NAME	Summary
R	Color Gain R	Accu Color control
G	Color Gain G	Accu Color control
B	Color Gain B	Accu Color control

Table 7 Summary of MDAC control (IC753 on CRT PWB)

PORT	NAME	Summary
R	Brightness R	Accu Color tracking control
G	Brightness G	Accu Color tracking control
B	Brightness B	Accu Color tracking control

3) Power Management System (PMS) Circuit

PMS circuits reduce power consumption. They have 3 modes of stand-by, suspend and off.

Table 8 PMS Mode (IC801)

Mode	Pin 33 PMS_SUS#	Pin 34 PMS_OFF	Pin 26 POWER LED
On	High	Low	High
Stand-by	High	Low	High
Suspend	Low	Low	Pulse(1KHz)
Off	Low	High	Low

a. Stand-by Mode

When the horizontal sync is not input, this monitor enters stand-by mode in a few seconds. IC801 controls IC791(OSD IC). Then video signal of IC711 pin 25, 30, 35 are stopped by blanking pulse IC791 pin 12. When the horizontal sync is input, this monitor returns to normal operation mode with the shortest recovery time.

b. Suspend Mode

When the vertical sync is not input, this monitor enters suspend mode in a few seconds. IC801 outputs pulse(1kHz) from pin 26. Because Q101 and Q102 toggle on-off alternately, LED101 turns yellow. IC801 pin 33 outputs low to operate each power saving circuit. Power saving circuit consists of saving circuit for +80V, that for +5V, that for F5V and that for±15V. When the vertical sync is input to this monitor, it becomes normal operation mode with longer recovery time than stand-by Mode.

c. OFF mode

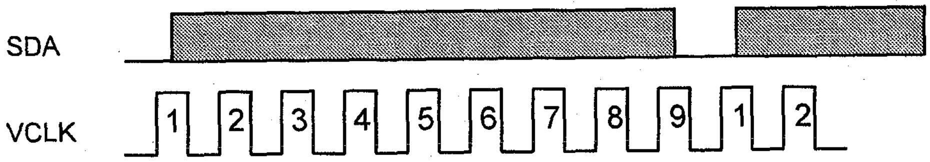
When the horizontal sync and vertical sync are not input, this monitor enters off mode in a few seconds. IC801 pin 34 becomes high, then PC601 turns on, in which the switching regulator circuit stops. (Pin 34 of IC801 becomes low.) When the horizontal sync is input, Q6F3 turns on, outputs pulse and as PC602 turns on, switching regulator circuit restarts.

4) Plug and Play (DDC 1 / 2)

VESA Display Data Channels (DDC)

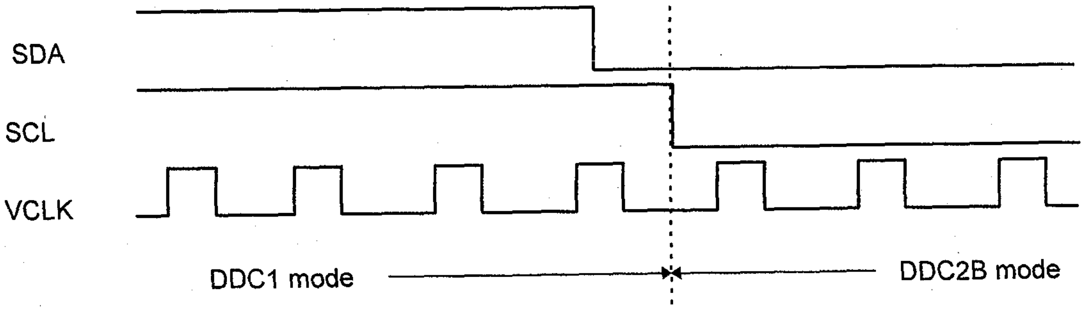
a. DDC1

When the monitor is turned on, the operation mode starts in DDC1 mode. When the VCLK (SYNC) is provided to IC8A1 pin 7, serial data stream is generated from the IC8A1 pin 5 by synchronizing with the rising edge of the VCLK. The contents of the serial data (SDA) is called EDID, and it contains the information of monitor's specification and supported signals. The EDID is composed of 8 bits, 128 bytes, but the individual data is composed of 9 bits. The 9th bit is always low and is ignored. If 128 bytes are finished to generate, then the 24LCS21 starts to generate the first byte. This operation lasts continuously until the operation mode changes to DDC2B.



b. DDC2B

When the SCL (IC8A1 pin 6) input is changed from high to low, the operation mode changes from DDC1 to DDC2B. The output data is the same as DDC1 (EDID), but the communication protocol is different. In DDC2B mode, the serial data is communicated by I^{2}C-bus protocol. The operation mode never go back from DDC2B to DDC1 except by turning off the monitor.



5) User Control Operation

User Control Interface (IC801)

Table 9 Input (IC801)

Pushed SW	pin 18	pin 19	pin 20	pin 21	pin 22	pin 23	pin 24
EXIT	High	Low	Low	Low	Low	Low	Low
-	Low	High	Low	Low	Low	Low	Low
▼	Low	Low	High	Low	Low	Low	Low
▲	Low	Low	Low	High	Low	Low	Low
+	Low	Low	Low	Low	High	Low	Low
PROCEED	Low	Low	Low	Low	Low	High	Low
RESET	Low	Low	Low	Low	Low	Low	High

① OSD

This model is adjusted through OSD (On Screen Display ; it is called OSM^{TM} in the USA), by operating Control Panel. It is located on the lower left corner of front panel.

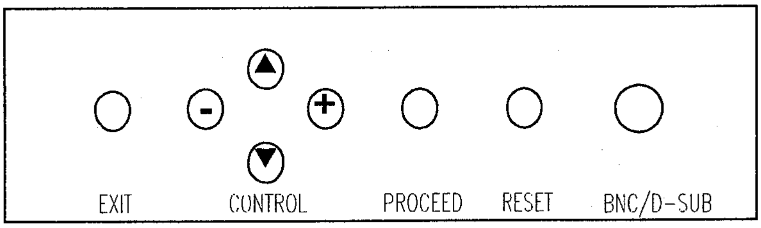


Fig. 6.2 Control Panel

② OSM MENU structure is as below. (It is structured "TAB", "SUB MENU")

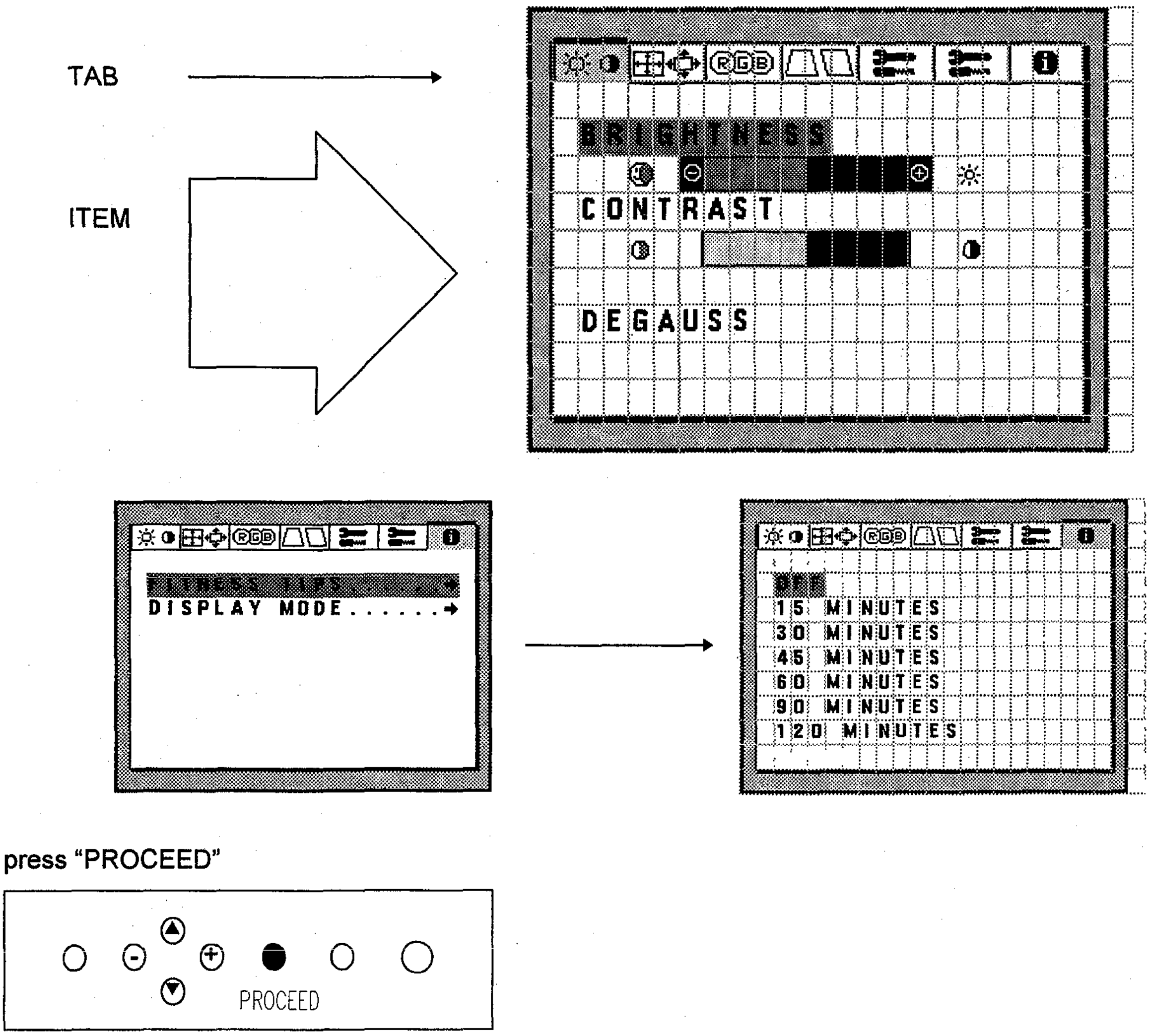

TAB
ITEM
BRIGHTNESS
CONTRAST
DEGAUSS
FITNESS TIPS
DISPLAY MODE
OFF
15 MINUTES
30 MINUTES
45 MINUTES
60 MINUTES
90 MINUTES
120 MINUTES
press "PROCEED"
PROCEED

Fig. 6.3 SUB MENU

Table 10 USER CONTROL SWITCH FUNCTION

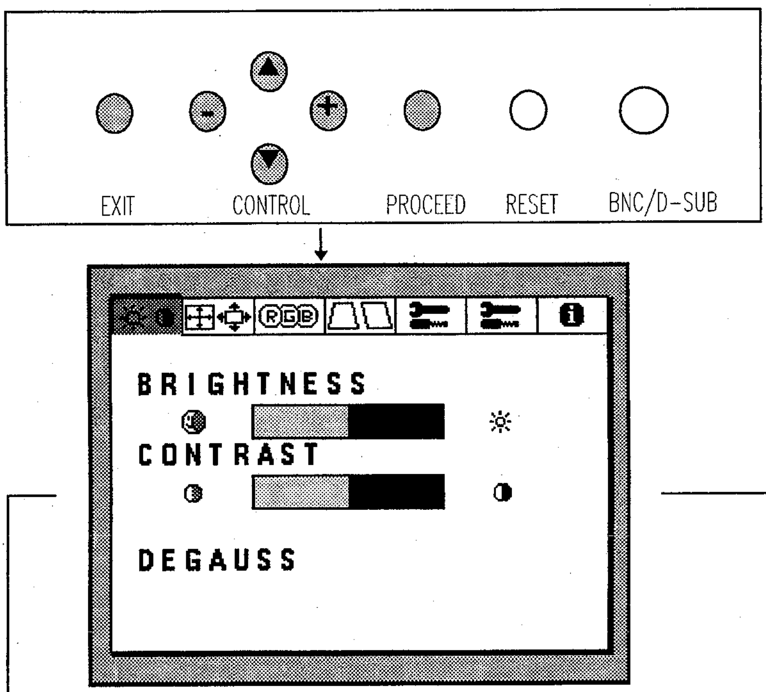
KEY MENU		"EXIT"	"−"	"+"	"▲"	"▼"	"PROCEED"
TAB	TAB		○	○			
TAB	ITEM					○	
ITEM	SUBMENU						○
ITEM	ITEM				○	○	
SUBMENU	ITEM	○					
ITEM	TAB	○			○*	○**	
ALLITEM	TAB	○					

* : Valid only if highlighted bar is on top ITEM

** : Valid only if highlighted bar is on bottom ITEM

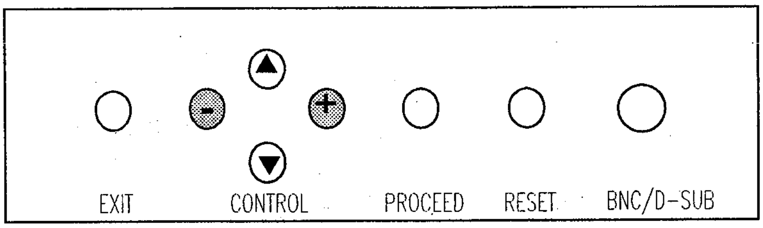
③ How to display OSM MENU

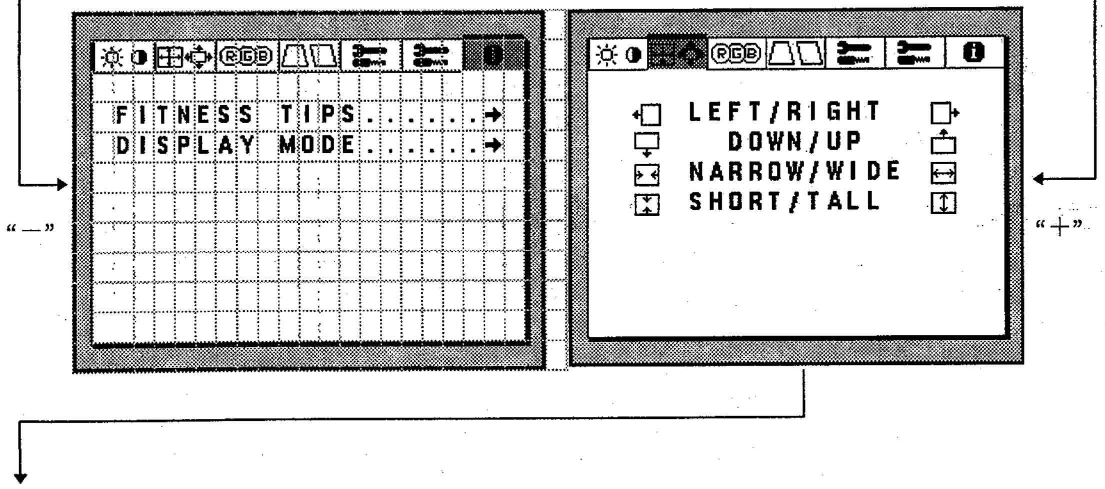
MENU(u) : Press "EXIT" or "−", "+", "▲", "▼", "PROCEED" once when OSM MENU is not displayed.


EXIT
CONTROL
PROCEED
RESET
BNC/D-SUB
RGB
BRIGHTNESS
CONTRAST
DEGAUSS

④ How to change TAB

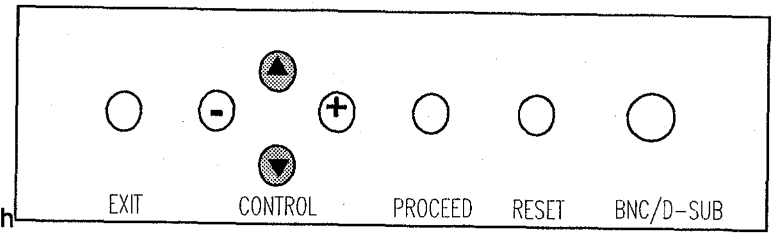
press "−" OR "+" switch while highlighted bar is on TAB

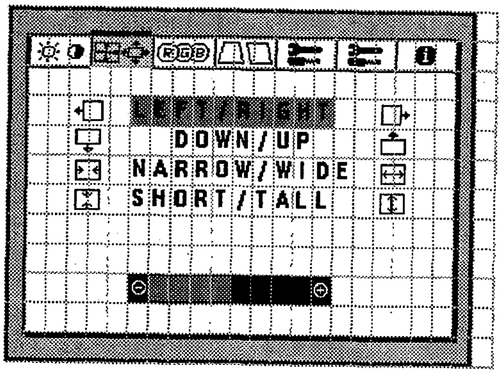

EXIT
CONTROL
PROCEED
RESET
BNC/D-SUB


"−"
RGB
FITNESS TIPS.......→
DISPLAY MODE......→
RGB
LEFT/RIGHT
DOWN/UP
NARROW/WIDE
SHORT/TALL
"+"

⑤ Select ITEM

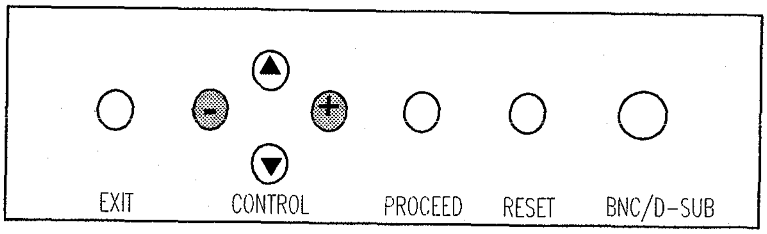
Press “▲” or “▼” switch

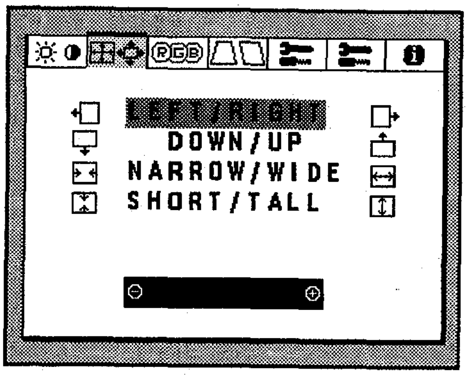

EXIT
CONTROL
PROCEED
RESET
BNC/D-SUB

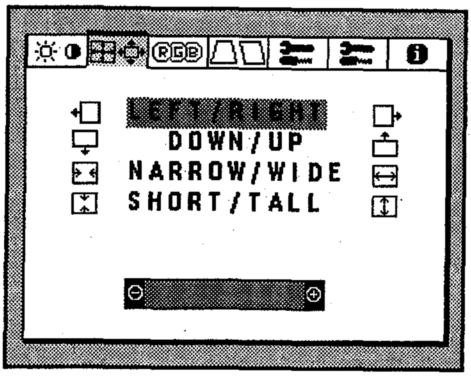

“▼”
RGB
LEFT/RIGHT
DOWN/UP
NARROW/WIDE
SHORT/TALL

6) Change DATA Value

Press “−” or “+” switch while highlighted BAR is on ITEM

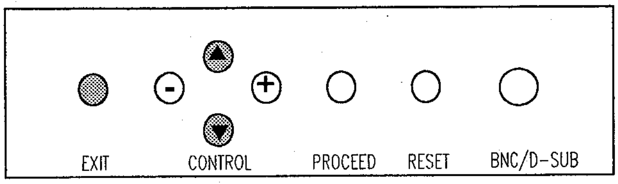

EXIT
CONTROL
PROCEED
RESET
BNC/D-SUB


“−”
RGB
LEFT/RIGHT
DOWN/UP
NARROW/WIDE
SHORT/TALL


“+”
RGB
LEFT/RIGHT
DOWN/UP
NARROW/WIDE
SHORT/TALL

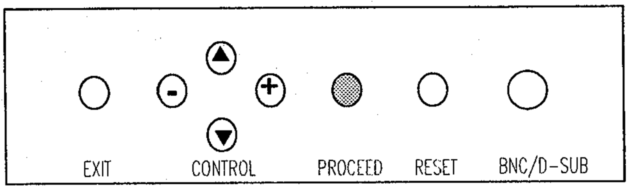
7) Save DATA Value To Memory

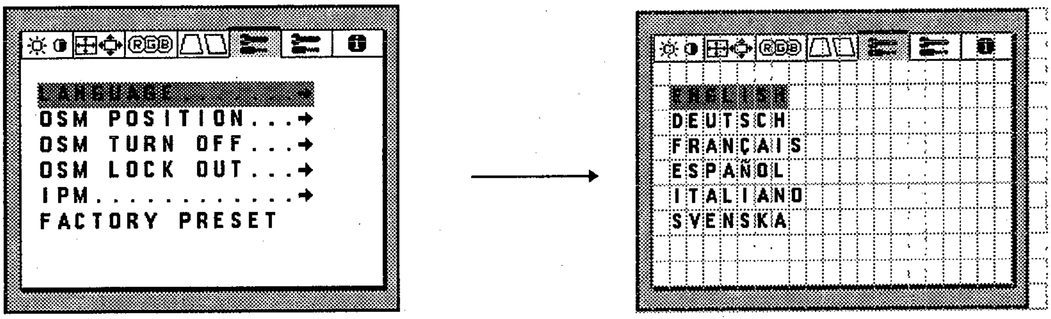
Move highlighted BAR to other “ITEM” or “TAB” (press “EXIT” or “▼”, “▲”)


EXIT
CONTROL
PROCEED
RESET
BNC/D-SUB

8) Open SUB MENU

Press “PROCEED” switch when the highlighted “ITEM” contains “..→”


EXIT
CONTROL
PROCEED
RESET
BNC/D-SUB

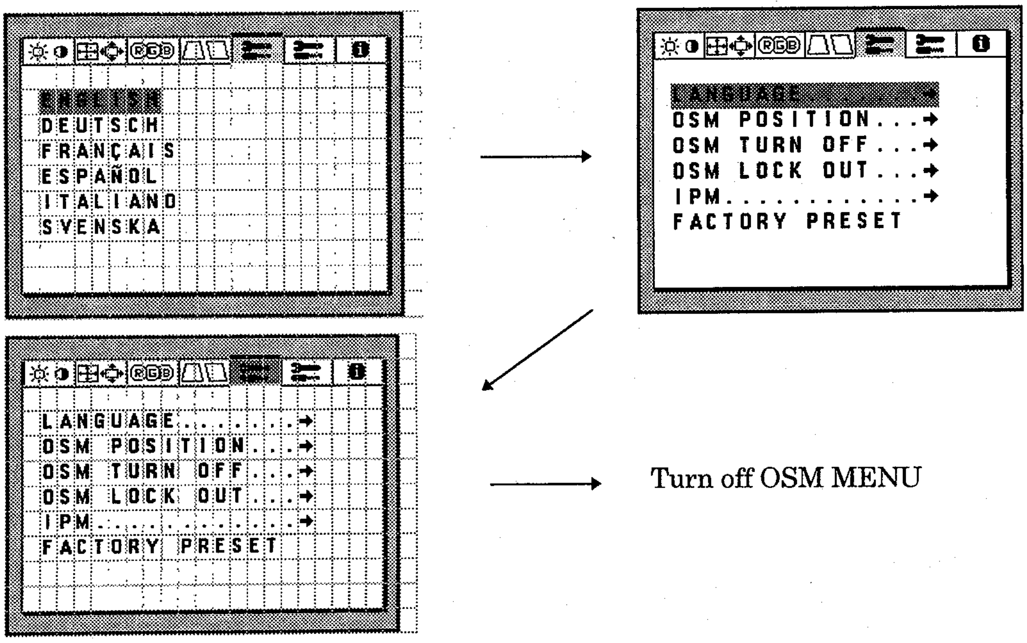

LANGUAGE........→
OSM POSITION...→
OSM TURN OFF...→
OSM LOCK OUT...→
IPM............→
FACTORY PRESET
ENGLISH
DEUTSCH
FRANÇAIS
ESPAÑOL
ITALIANO
SVENSKA

9) Turn off OSM MENU

Press “EXIT” switch once : when highlighted BAR is on “TAB”

twice : when highlighted BAR is on “TAB”

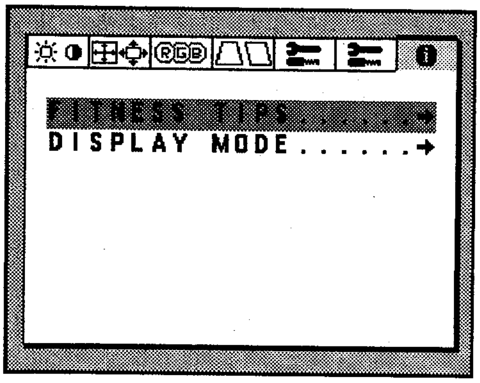
three times : when entering “SUB MENU”


ENGLISH
DEUTSCH
FRANÇAIS
ESPAÑOL
ITALIANO
SVENSKA
LANGUAGE........→
OSM POSITION...→
OSM TURN OFF...→
OSM LOCK OUT...→
IPM............→
FACTORY PRESET

Turn off OSM MENU

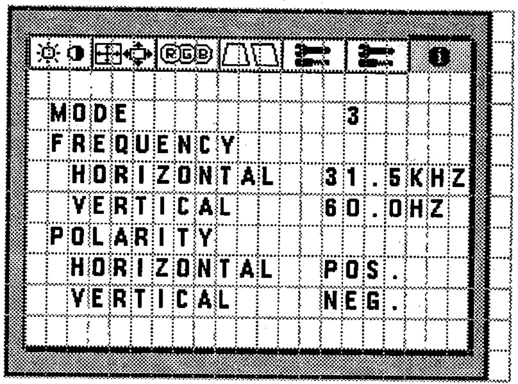
10) Open MENU(s)

Open menu "INFORMATION" - "DISPLAY MODE"



FITNESS TIPS......→

DISPLAY MODE......→



MODE 3

FREQUENCY

HORIZONTAL 31.5KHZ

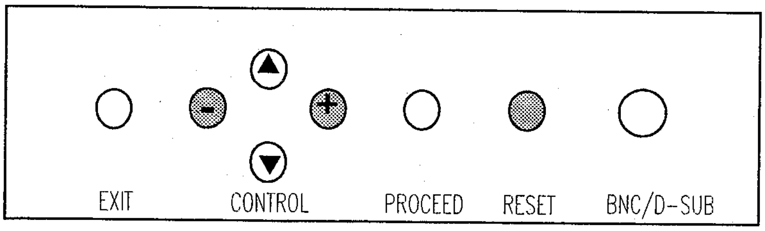
VERTICAL 60.0HZ

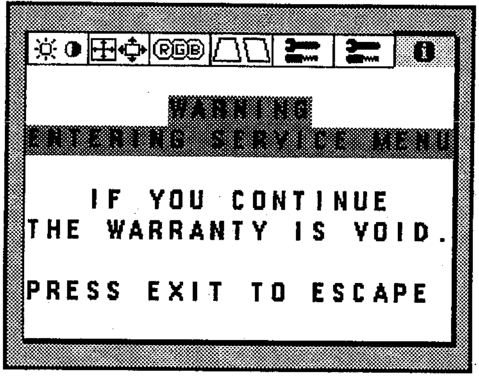
POLARITY

HORIZONTAL POS.

VERTICAL NEG.

then press "RESET" and "+", "−" switch at same time





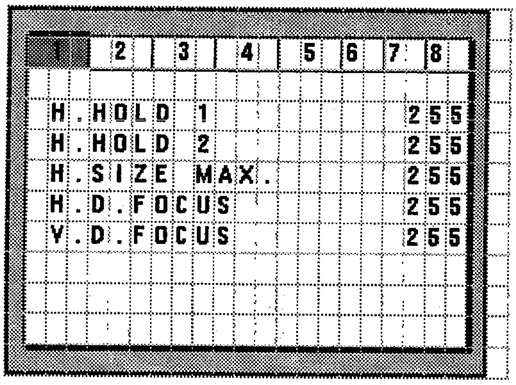
WARNING

ENTERING SERVICE MENU

IF YOU CONTINUE

THE WARRANTY IS VOID.

PRESS EXIT TO ESCAPE



1 2 3 4 5 6 7 8

H.HOLD 1 255

H.HOLD 2 255

H.SIZE MAX. 255

H.D.FOCUS 255

V.D.FOCUS 255

A warning message will be displayed, then press "PROCEED"

- OSM MENU Structure

1. MENU(u)

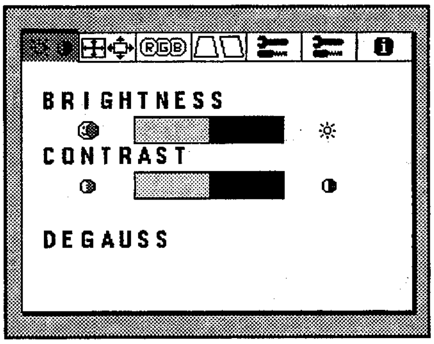

BRIGHTNESS
CONTRAST
DEGAUSS

Fig. 6.4 MENU(u) - “BRIGHTNESS&CONTRAST”

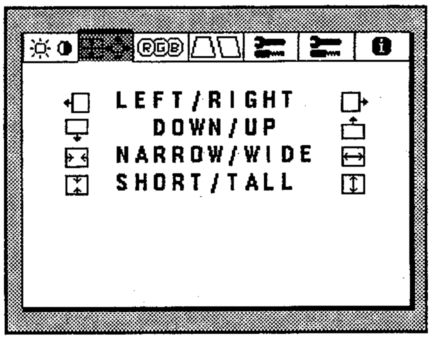

LEFT/RIGHT
DOWN/UP
NARROW/WIDE
SHORT/TALL

Fig. 6.5 MENU(u) - “SIZE & POSITION”

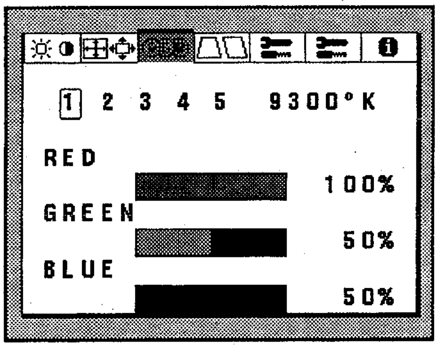

1 2 3 4 5 9300°K
RED
100%
GREEN
50%
BLUE
50%

Fig. 6.6 MENU(u) - “RGB”

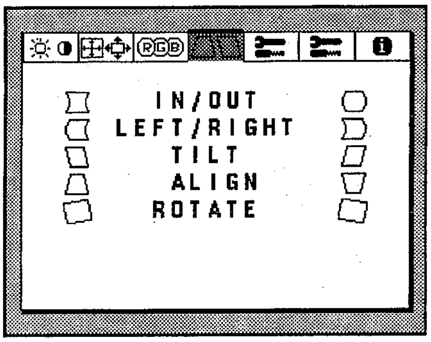

IN/OUT
LEFT/RIGHT
TILT
ALIGN
ROTATE

Fig. 6.7 MENU(u) “GEOMETRY”

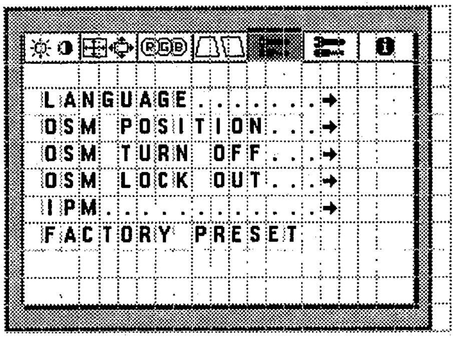

LANGUAGE........→
OSM POSITION...→
OSM TURN OFF...→
OSM LOCK OUT...→
IPM............→
FACTORY PRESET

Fig. 6.8 MENU(u) - “TOOL1”

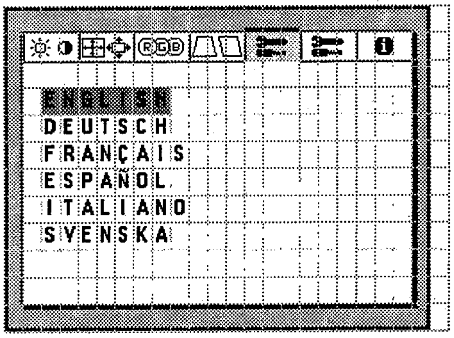

ENGLISH
DEUTSCH
FRANÇAIS
ESPAÑOL
ITALIANO
SVENSKA

Fig. 6.9 SUB MENU(u) - “LANGUAGE”

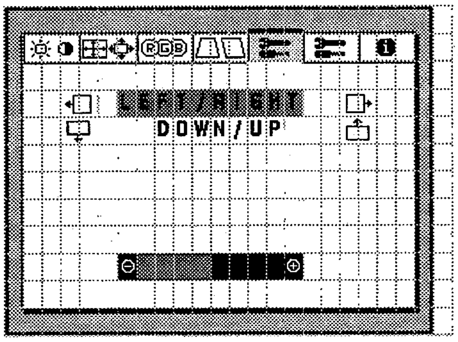

LEFT/RIGHT
DOWN/UP

Fig. 6.10 SUB MENU(u) - “OSM POSITION”

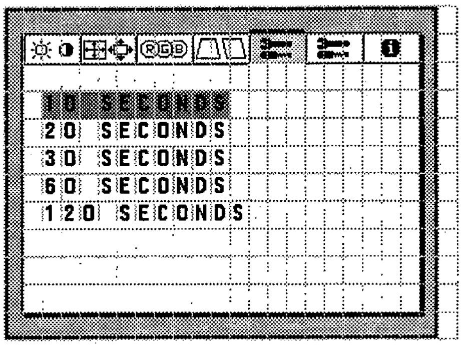
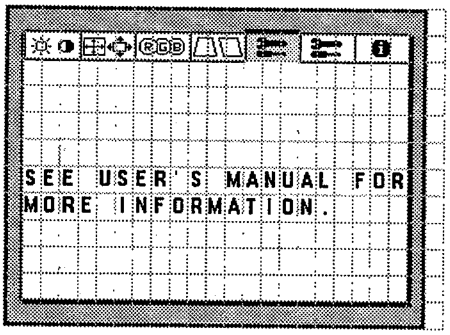

10 SECONDS
20 SECONDS
30 SECONDS
60 SECONDS
120 SECONDS

Fig. 6.11 SUB MENU(u) - “OSM TURN OFF”



SEE USER'S MANUAL FOR MORE INFORMATION.

Fig. 6.12 SUB MENU(u) - "OSM LOCK OUT"

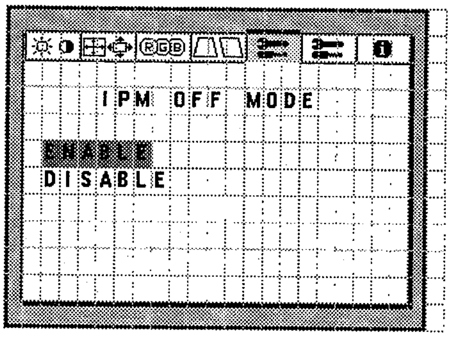

IPM OFF MODE
ENABLE
DISABLE

Fig. 6.13 SUB MENU(u) - "IPM"

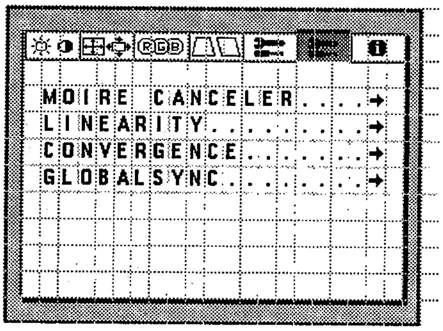
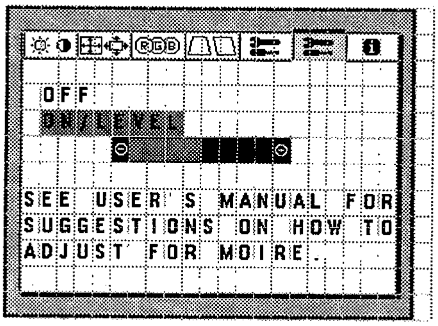
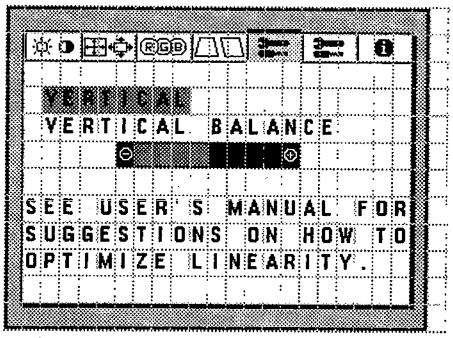

MOIRE CANCELER....→
LINEARITY.........→
CONVERGENCE.......→
GLOBALSYNC........→

Fig. 6.14 MENU(u) - "TOOL2"


OFF
ON/LEVEL
⊖
⊕

SEE USER'S MANUAL FOR SUGGESTIONS ON HOW TO ADJUST FOR MOIRE.

Fig. 6.15 SUB MENU(u) -"MOIRE CANCELER"


VERTICAL
VERTICAL BALANCE
⊖
⊕

SEE USER'S MANUAL FOR SUGGESTIONS ON HOW TO OPTIMIZE LINEARITY.

Fig. 6.16 SUB MENU(u) - "LINEARITY"

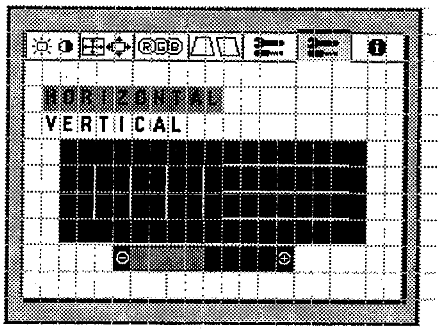
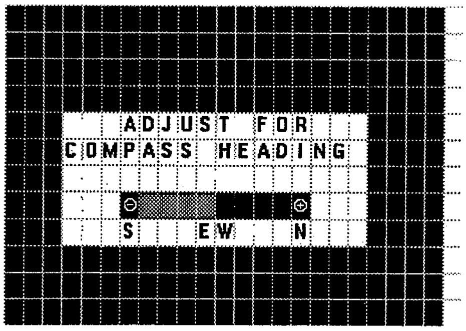

HORIZONTAL
VERTICAL
⊖
⊕

Fig. 6.17 SUB MENU(u) - "CONVERGENCE"



ADJUST FOR COMPASS HEADING

Fig. 6.18 SUB MENU(u) - "GLOBALSYNC"

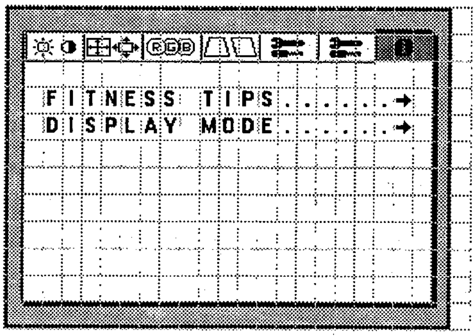
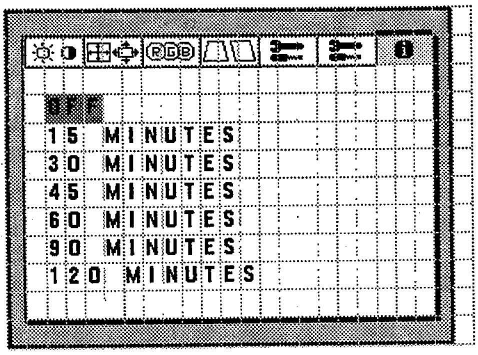
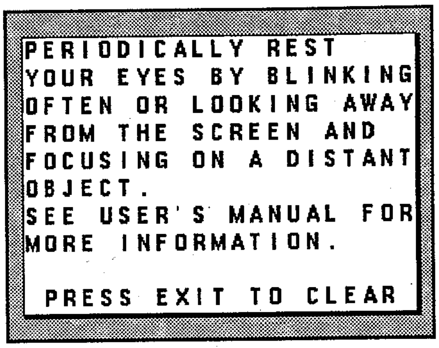

FITNESS TIPS......→
DISPLAY MODE......→

Fig. 6.19 MENU(u) - "INFORMATION"



OFF
15 MINUTES
30 MINUTES
45 MINUTES
60 MINUTES
90 MINUTES
120 MINUTES

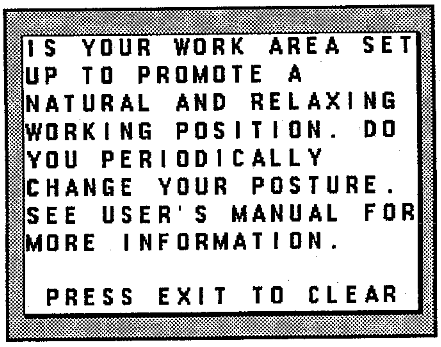
Fig. 6.20 "FITNESS TIPS" setting



PERIODICALLY REST YOUR EYES BY BLINKING OFTEN OR LOOKING AWAY FROM THE SCREEN AND FOCUSING ON A DISTANT OBJECT.
SEE USER'S MANUAL FOR MORE INFORMATION.

PRESS EXIT TO CLEAR

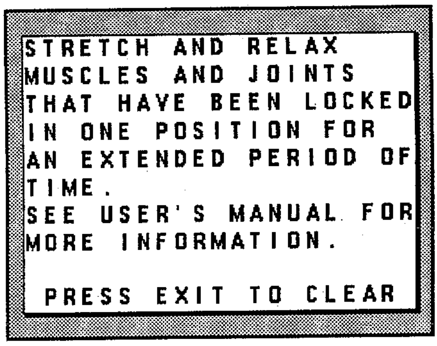
Fig. 6.21 "FITNESS TIPS" MESSAGE - 1



IS YOUR WORK AREA SET UP TO PROMOTE A NATURAL AND RELAXING WORKING POSITION. DO YOU PERIODICALLY CHANGE YOUR POSTURE.
SEE USER'S MANUAL FOR MORE INFORMATION.

PRESS EXIT TO CLEAR

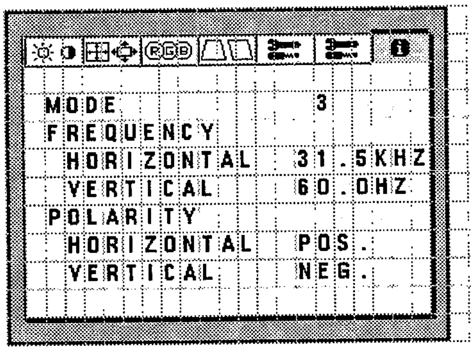
Fig. 6.22 "FITNESS TIPS" MESSAGE - 2



STRETCH AND RELAX MUSCLES AND JOINTS THAT HAVE BEEN LOCKED IN ONE POSITION FOR AN EXTENDED PERIOD OF TIME.
SEE USER'S MANUAL FOR MORE INFORMATION.

PRESS EXIT TO CLEAR

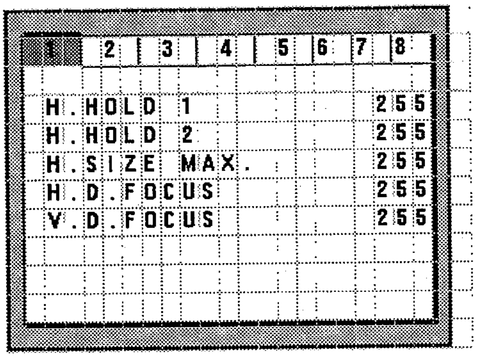
Fig. 6.23 "FITNESS TIPS" MESSAGE - 3



```
MODE                3
FREQUENCY
  HORIZONTAL       31.5KHZ
  VERTICAL         60.0HZ
POLARITY
  HORIZONTAL       POS.
  VERTICAL         NEG.
```

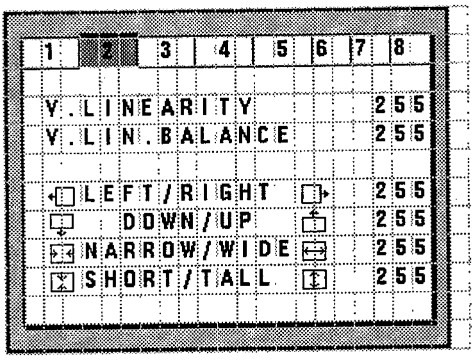
Fig. 6.24 "DISPLAY MODE"

2. MENU(s)



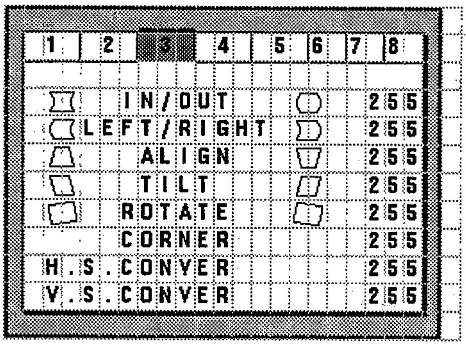
```
H.HOLD 1              255
H.HOLD 2              255
H.SIZE MAX.           255
H.D.FOCUS             255
V.D.FOCUS             255
```

Fig. 6.25 MENU(s) - TAB1



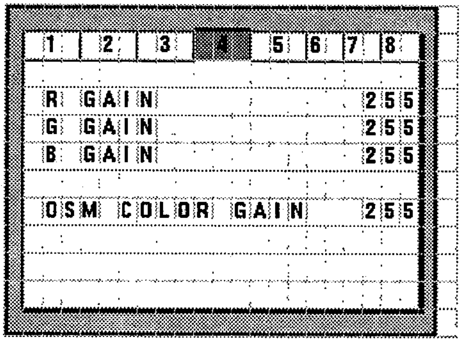
```
V.LINEARITY           255
V.LIN.BALANCE         255

LEFT/RIGHT            255
  DOWN/UP             255
NARROW/WIDE           255
SHORT/TALL            255
```

Fig. 6.26 MENU(s) - TAB2



IN/OUT 255
LEFT/RIGHT 255
ALIGN 255
TILT 255
ROTATE 255
CORNER 255
H.S.CONVER 255
V.S.CONVER 255

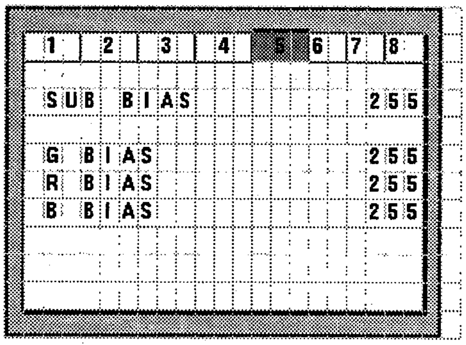
Fig. 6.27 MENU(s) - TAB3



R GAIN 255
G GAIN 255
B GAIN 255

OSM COLOR GAIN 255

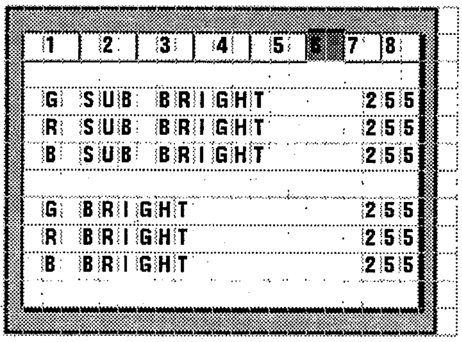
Fig. 6.28 MENU(s) - TAB4



SUB BIAS 255

G BIAS 255
R BIAS 255
B BIAS 255

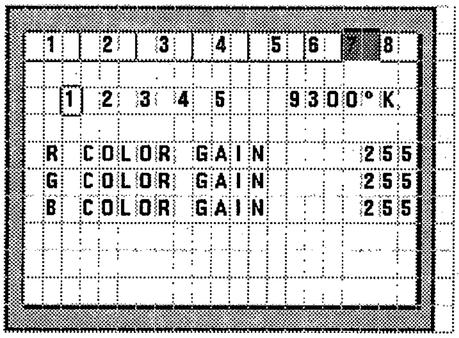
Fig. 6.29 MENU(s) - TAB5



G SUB BRIGHT 255
R SUB BRIGHT 255
B SUB BRIGHT 255

G BRIGHT 255
R BRIGHT 255
B BRIGHT 255

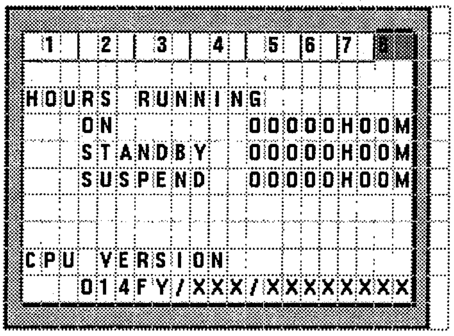
Fig. 6.30 MENU(s) - TAB6



1 2 3 4 5 9300°K

R COLOR GAIN 255
G COLOR GAIN 255
B COLOR GAIN 255

Fig. 6.31 MENU(s) - TAB7



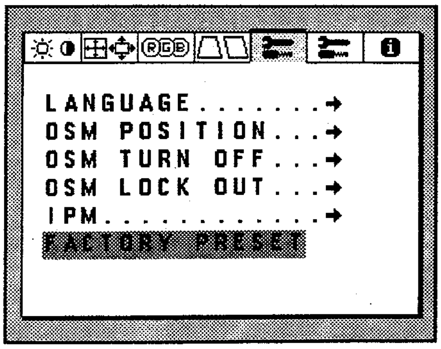
HOURS RUNNING
ON 00000H00M
STANDBY 00000H00M
SUSPEND 00000H00M

CPU VERSION
014FY/XXX/XXXXXXX

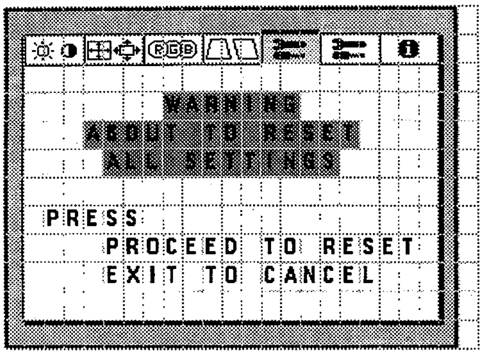
Fig. 6.32 MENU(s) - TAB8

Factory Preset

Open Menu(u) - "TOOL1", then move highlighted BAR to "FACTORY PRESET"


RGB
LANGUAGE.......→
OSM POSITION...→
OSM TURN OFF...→
OSM LOCK OUT...→
IPM...........→
FACTORY PRESET

"Warning message" will be displayed, when "RESET" switch is pressed.



WARNING
ABOUT TO RESET
ALL SETTINGS

PRESS
PROCEED TO RESET
EXIT TO CANCEL

All user setting are set to "FACTORY PRESET" value when "PROCEED" switch is pressed.

Table 11 FACTORY PRESET

TAB	ITEM	preset value
BRIGHTNESS & CONTRAST	BRIGHTNESS	SET TO FACTORY PRESET (1/3 Scroll Bar)
	CONTRAST	MAXIMUM
	DEGAUSS	---
SIZE & POSITION	ALL ITEMS	SET TO FACTORY PRESET
RGB	12345	NO. 1
	RED, GREEN, BLUE	SET TO FACTORY PRESET
GEOMETRY	ALL ITEMS	SET TO FACTORY PRESET
TOOL1	LANGUAGE	NO CHANGE
	OSM POSITION	SET TO FACTORY PRESET
	OSM TURN OFF	30 SECONDS
	OSM LOCK OUT	---
	IPM	ENABLE
TOOL2	MOIRE CANCELER	MODE : OFF LEVEL : MINIMUM
	LINEARITY	SET TO FACTORY PRESET
	CONVERGENCE	SET TO FACTORY PRESET
	GLOBALSYNC	VARIABLE CENTER POSITION

FITNESS TIPS

How to confirm "FITNESS TIPS" message.

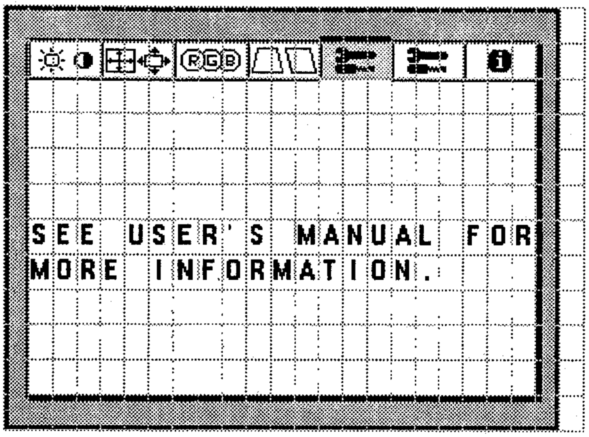
1) Open SUB MENU(u) - "INFORMATION" - "FITNESS TIPS"
2) Press "+" and "−" switch together, then message will be displayed.
3) Press "+" switch, then message will change.
4) Press "+" switch, then message will change.
5) Press "+" switch, the SUB MENU(u) - "INFORMATION" - "FITNESS TIPS" will be displayed.

OSM LOCK OUT

1) Open MENU(u) - "TOOL1"

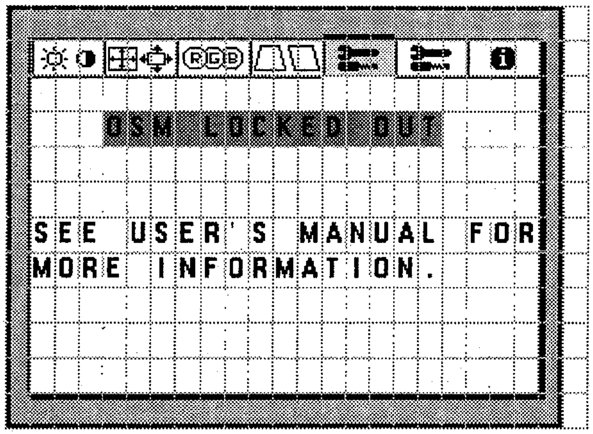
2) Move highlighted BAR to "OSM LOCK OUT"

3) Press "PROCEED" switch while "OSM LOCK OUT" is highlighted, then message will be displayed as below.



SEE USER'S MANUAL FOR MORE INFORMATION.

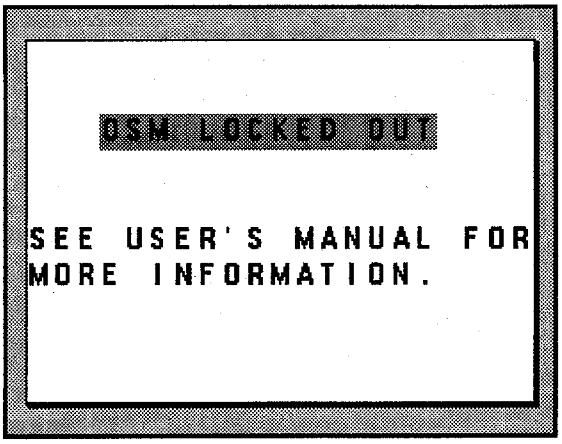
4) Press "▲" and "PROCEED" switch together, then message will be displayed as below, and OSM is locked out.



OSM LOCKED OUT

SEE USER'S MANUAL FOR MORE INFORMATION.

5) Any control switch does not work while OSM is locked out. And message is displayed as below.



OSM LOCKED OUT

SEE USER'S MANUAL FOR MORE INFORMATION.

6) To unlock "OSM LOCK OUT", press "▲" and "PROCEED" switch together when the above message is displayed.

7. MOIRE CANCELLER

The timing pulse is outputted from IC 5L1 pin 7. Its frequency is half of the horizontal frequency. $(\frac{horizontalfrequency}{2})$

Timing pulses are added to the level shift circuit (R50G, R50K, R50H) through Q50G in which the output voltage from level shift circuit is controlled by DAC output voltage from IC961 pin 15. Its voltage is added to C50K through the current amplifier (Q50H), which results in shifting of alternate horizontal lines.

8. SWITCHING REGULATOR CIRCUIT

1) Rectifying and Smoothing Circuit

AC input is rectified by D601 and is smoothed by C609.
The resulting DC voltage is supplied to the converter circuit.

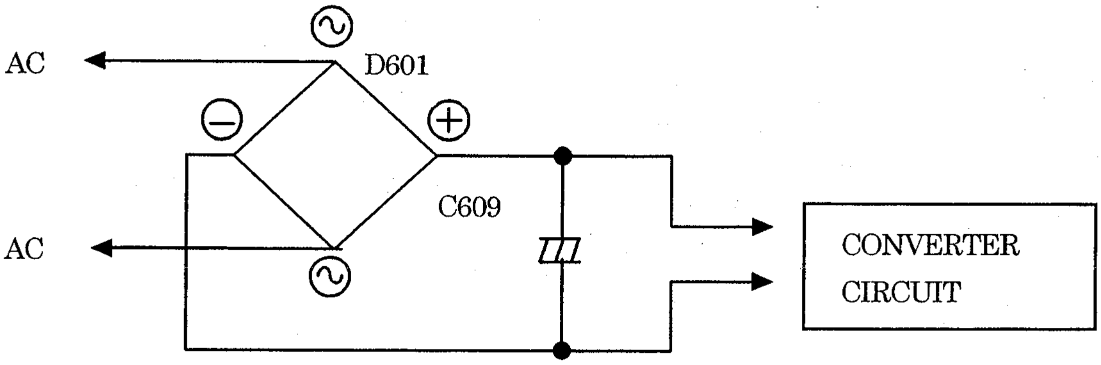


Fig. 8.1 Rectifying and Smoothing Circuit

2) Auxiliary Power Supply Circuit

The auxiliary power supply circuit is needed to activate IC621. When the power switch is turned on, the charging current flows into the capacitor C612 through R603 and R604. Oscillation starts when the voltage of IC621 pin 7 reaches 17V by this charging operation. After the start of oscillation, the fly-back voltage of the auxiliary winding of T601 is rectified and smoothed by D603, D623, C612 and C627. The resulting DC voltage is supplied to IC621 pin 7.

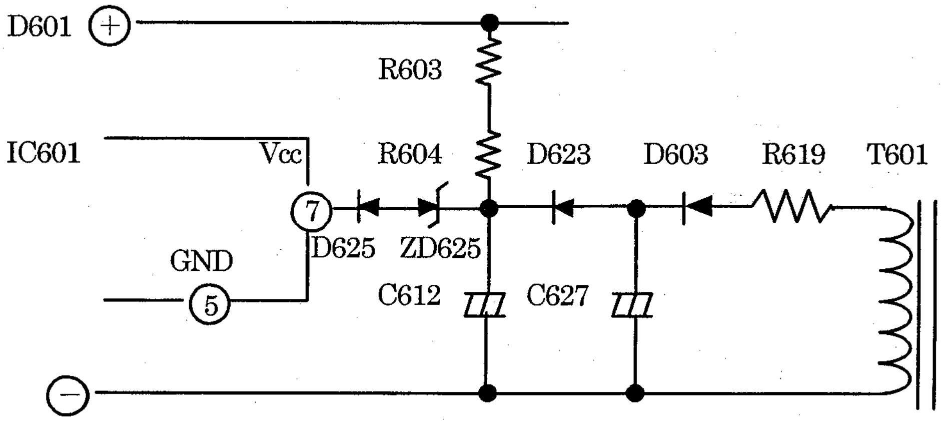


Fig. 8.2 Auxiliary power Supply Circuit

3) Converter Circuit

The converter circuit consists of the primary winding of T601, a switching device (Q601 and Q604)and surge absorbers (C610, C611, R605, R606, and D602) which are connected to the primary winding of T601.

The oscillating signal from IC621 pin 6 is applied to the gate of Q601 and Q604 so that the drain-source is turned ON and OFF. In result, the oscillating voltage is applied to the primary winding of T601.

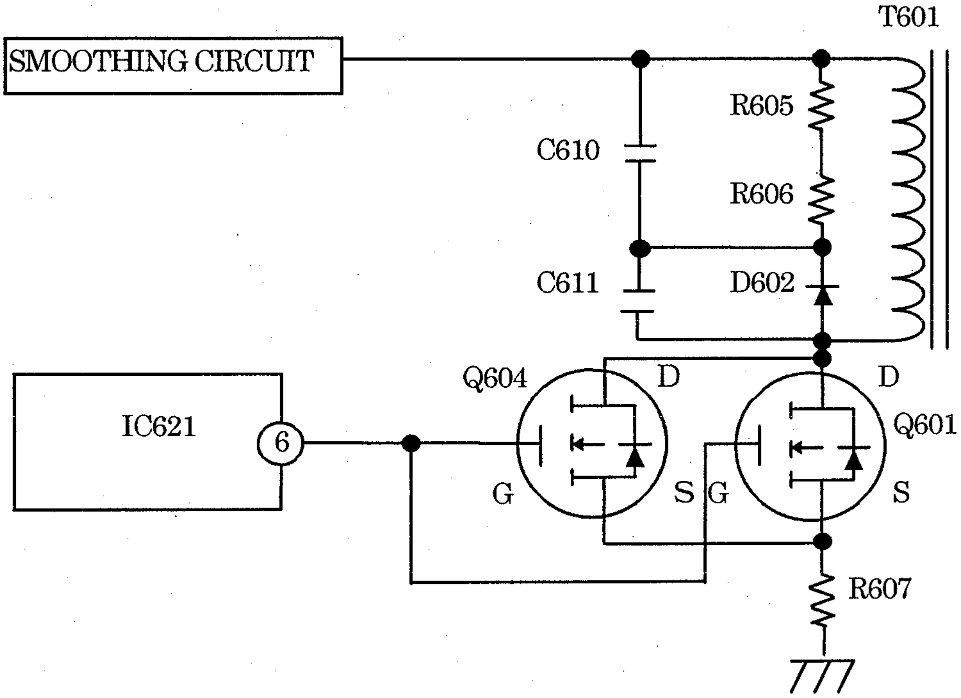

T601
SMOOTHING CIRCUIT
R605
C610
R606
C611
D602
Q604
D
D
IC621
6
Q601
G
S
G
S
R607

Fig. 8.3 Converter Circuit

4) Output Rectifying and Smoothing Circuit

The fly-back voltages which are generated at the secondary windings of T601 are rectified by D6A1, D6A2, D6A3, D6A4, D6A6 and D6A7. Then, these voltages are smoothing by C6A3, C6A4, C6A7, C6A8, C6E1, C6E2, C6E3, C6E5, C6E6, C6E7, C6E8 and C6E9 in which DC voltages are obtained. The DC voltages are maintained constantly by controlling the ON period duty cycle of Q601 and Q604 in the converter circuit.

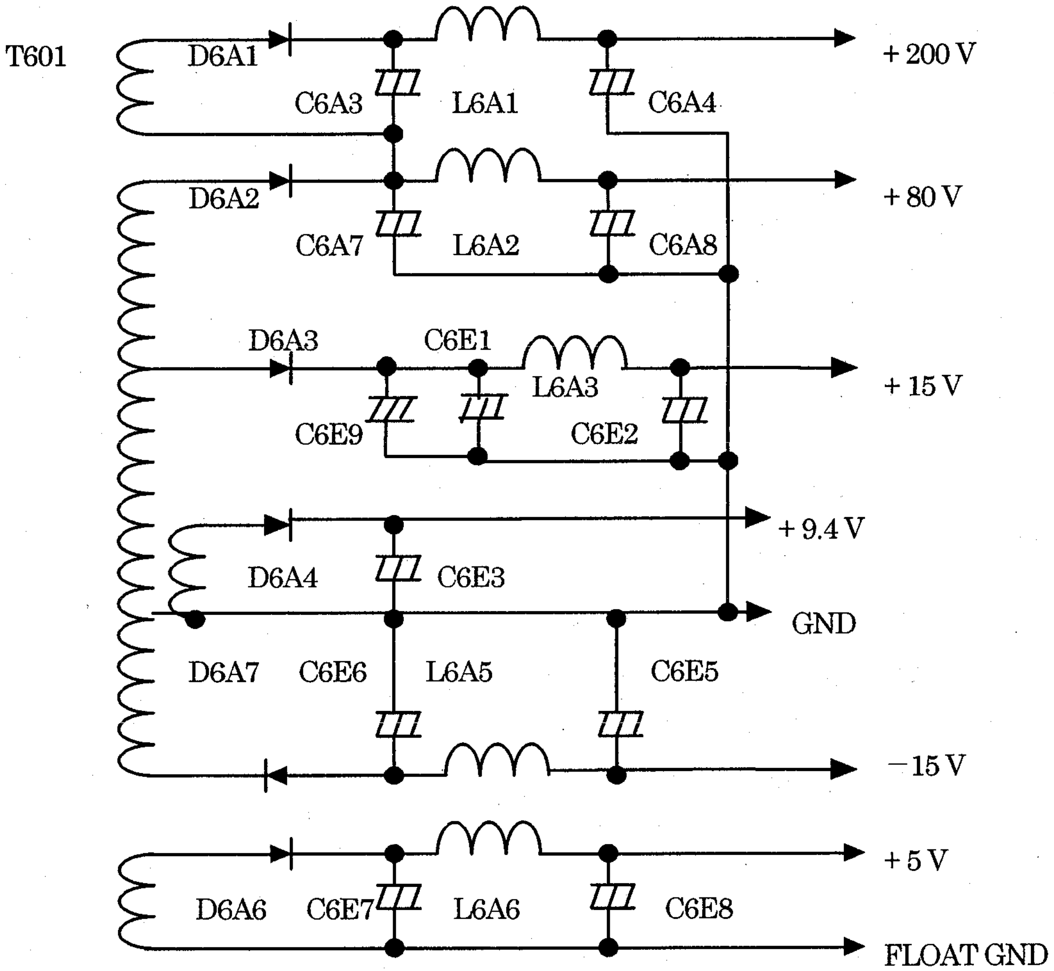

T601
D6A1
C6A3
L6A1
C6A4
+200 V
D6A2
C6A7
L6A2
C6A8
+80 V
D6A3
C6E1
L6A3
C6E9
C6E2
+15 V
+9.4 V
D6A4
C6E3
GND
D6A7
C6E6
L6A5
C6E5
−15 V
+5 V
D6A6
C6E7
L6A6
C6E8
FLOAT GND

Fig. 8.4 Output Rectifying and smoothing Circuit

5) Error Detection Amplifier Circuit

The output voltage 80V is divided by the resistors R6E4, R6F5 and VR6A1.
This divided voltage is compared with the reference voltage at the error amplifier IC6F1.
An error signal is applied to the control circuit via the photocupler PC603.

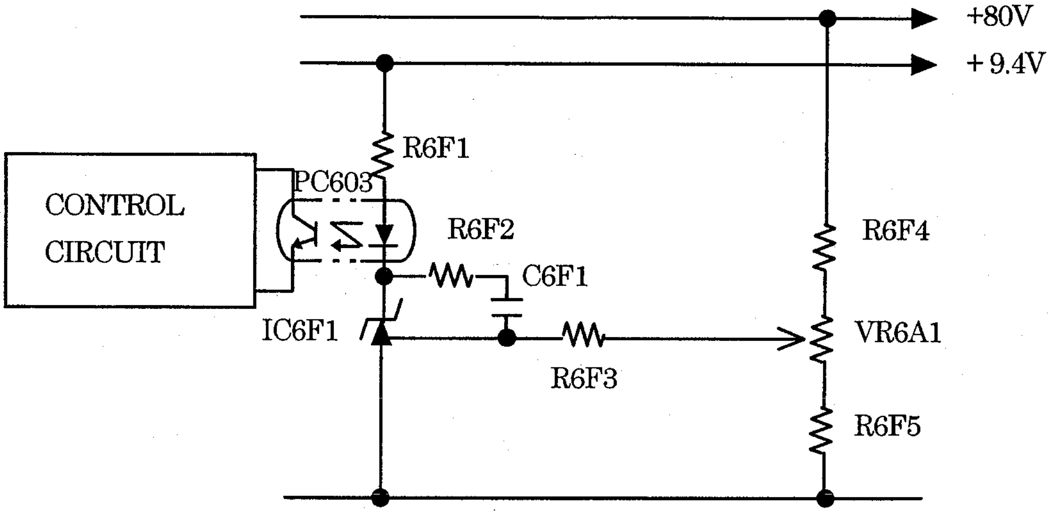

+80V
+9.4V
R6F1
PC603
CONTROL CIRCUIT
R6F2
C6F1
IC6F1
R6F3
R6F4
VR6A1
R6F5

Fig. 8.5 Error Detection Amplifier Circuit

6) Synchronized Circuit

When the horizontal frequency is higher than 69KHz, IC6A1 changes the pulse to half. If lower than 69KHz, IC6A1 generates horizontal frequency. Q6A1 switches on and off using the output pulse of IC6A1. The oscillation voltage made by Q6A1 is applied to the winding of pulse transformer T602. The forward voltage is generated at the primary winding of T602 and is the trigger pulse for oscillating and control circuit.

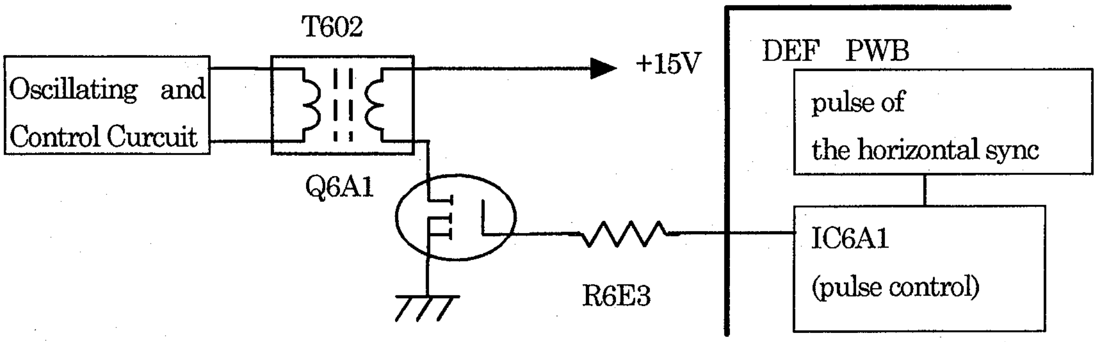

T602
Oscillating and Control Curcuit
+15V
Q6A1
R6E3
DEF PWB
pulse of the horizontal sync
IC6A1 (pulse control)

Fig. 8.6 Synchronized Circuit

7) Oscillating and Control Circuit

The oscillating and control circuits are contained in IC621. IC621 has a built-in oscillator which its frequency is determined by R640 and C630 that are connected to pin 4 and pin 8.

When signal is applied to R646, the switching frequency is synchronized with the horizontal frequency or 1/2 the horizontal frequency which are generated by synchronized circuit. The output of the error detection amplifier circuit is fed back to IC621 pin 2 via PC603 to control the duty cycle of Q601. In result, the output voltage is kept constant.

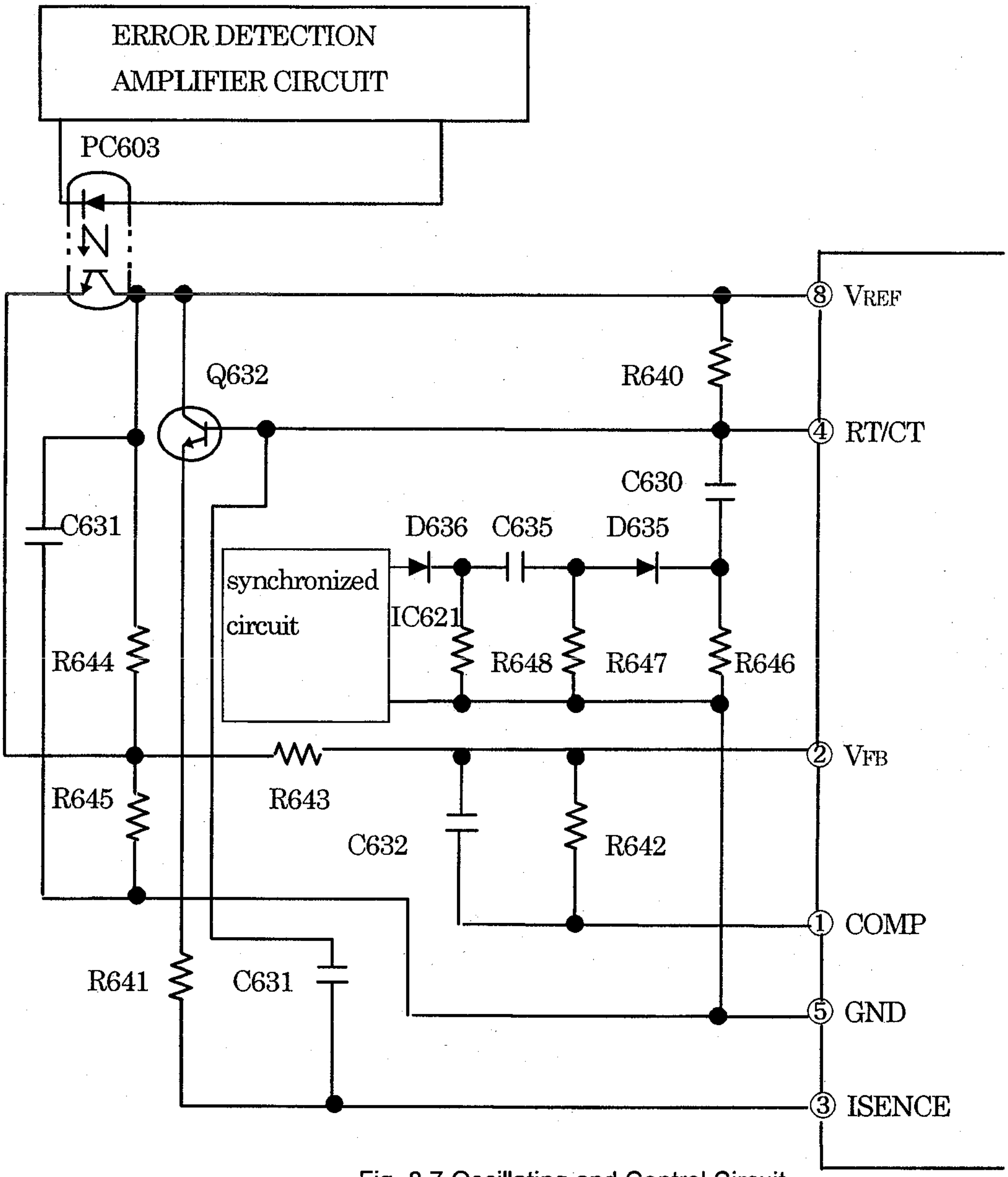

ERROR DETECTION
AMPLIFIER CIRCUIT
PC603
Q632
R640
C630
C631
D636
C635
D635
synchronized circuit
IC621
R644
R648
R647
R646
R645
R643
C632
R642
R641
C631
⑧ VREF
④ RT/CT
② VFB
① COMP
⑤ GND
③ ISENCE

Fig. 8.7 Oscillating and Control Circuit

8) Overvoltage Protection

If failure occurs which causes the output voltage of the secondary windings of T601 to increase, the voltage of the auxiliary winding of T601 will increase propotionally. When the voltage of IC621 pin 7 increase beyond the zener voltage of ZD627, Q631 will turn on which then turns on Q633. This action will decrease the voltage of IC621 pin 1 and will stop the oscillation within this IC.

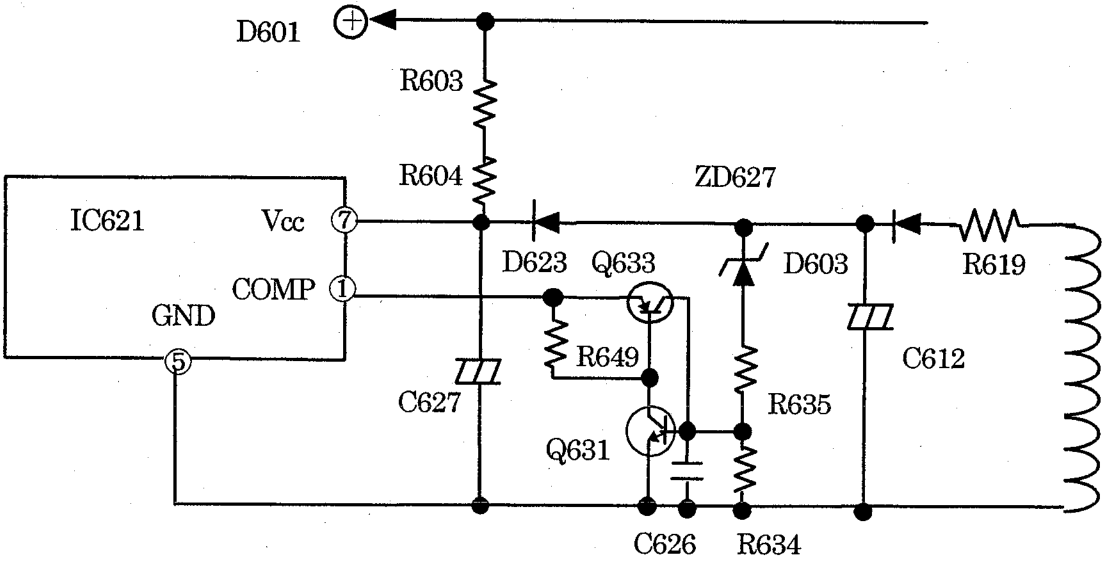

D601
R603
R604
ZD627
IC621
Vcc ⑦
COMP ①
GND
⑤
D623
Q633
D603
R619
R649
C612
C627
R635
Q631
C626
R634

Fig. 8.8 Overvoltage Protection

9) Degaussing Circuit

When the degauss terminal is high, RL601 is switched on and the current flows through the degaussing coil. When the degauss terminal is low, RL601 is switched off and the degaussing coil becomes open. The degauss terminal signal becomes high for about 3 seconds when the power SW is switched on or the manual degauss switch is activated.

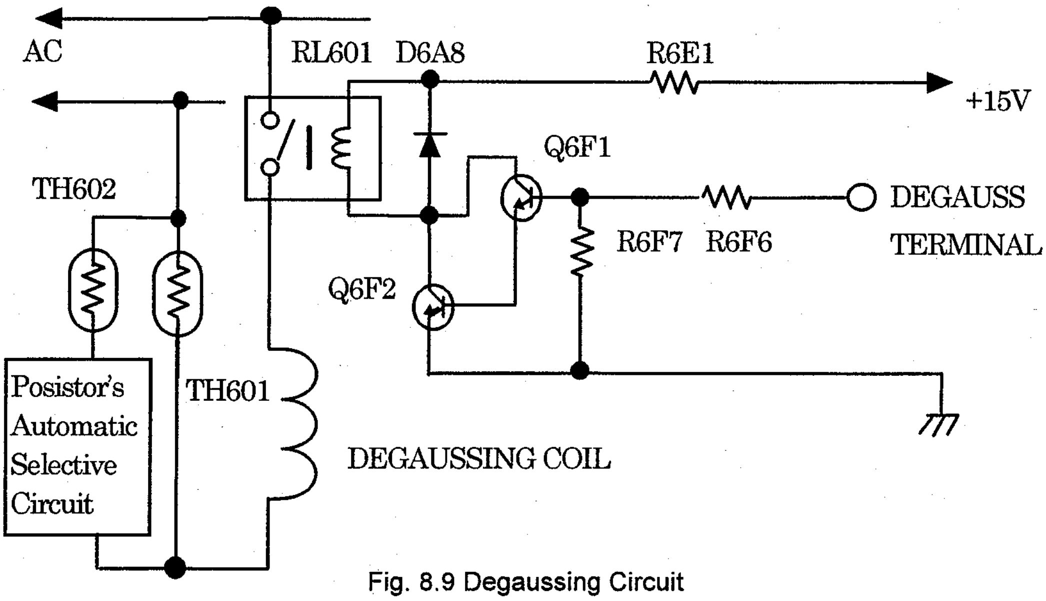

AC
RL601
D6A8
R6E1
+15V
Q6F1
TH602
DEGAUSS TERMINAL
R6F7
R6F6
Q6F2
Posistor's Automatic Selective Circuit
TH601
DEGAUSSING COIL

Fig. 8.9 Degaussing Circuit

10) Posistor's Automatic Selective Circuit

When the power switch is turn on, the voltage of C609 is detected by IC661. If it is less than 210Vdc, IC661 output is high. This will cause Q661 and RL602 to turn on. Then the posistor TH602 is connected in parallel with TH601. If the voltage of C609 is more than 210Vdc, IC661 output is low. This will cause Q661 to turn off, and the posistor TH602 is not connected.

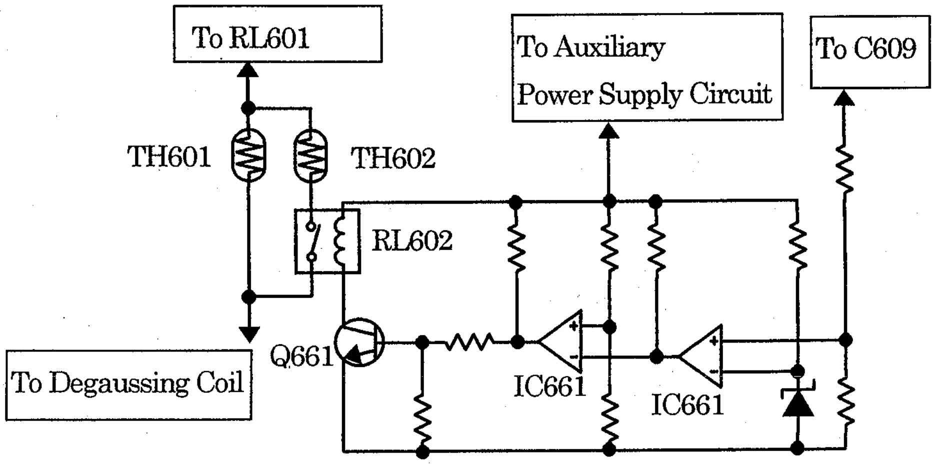


Fig. 8.10 Posistor's Automatic Selective Circuit

9. STATIC CONVERGENCE CORRECTION CIRCUIT

The static convergence correction circuit operates by adjusting the DC current flowing at both (the horizontal and vertical convergence correction) coils which are constructed on the deflection yoke.

The DC current is controlled by the D/A converter output voltage. The current changes direction at the center voltage (2.5V) of the D/A converter output voltage (0V ~ 5V). This current flows to the feedback resistors (R8H7 , R8J5), and is detected as voltage at the feedback resistors. This voltage is fed back to IC8H1 as the D/A converter control voltage.

10. EARTH MAGNETIC FIELD CORRECTION CIRCUIT

The earth magnetic field correction circuit compensates for the earth's natural magnetic interference which can cause purity problems. This function is enduser adjusted though the OSD. The DC correction current flows in the EMF (Earth Magnetic Field) coil. This circuit's operation is similar to the static convergence circuits operation. R443 is the feedback resistor.

REPLACEMENT PARTS LIST

The components specified for Model JC-2145UMA

Note: The components identified by⚠make are critical for safety.
Replace only with parts Number specified.

SYMBOL	PARTS NO	DESCRIPTION
*** CRT & TUNER ***		
⚠CRT	33021511	CRT M50LJG39X27
*** ICS ***		
IC6F1	370A1009	IC UPC1093J-T (REG)
IC952	37005085	IC UPC78L12J
IC851	37005193	IC PQ12RF11 (REG)
IC503	37005221	IC UPC78M09AHF
IC803	37005277	IC PQ05RR13 (REG)
IC401	37006022	IC LA7846N
IC501	37009036	IC UPC1883ACT
IC751	37010007	IC M52324P
IC4A1	37010008	IC CA0007AD
IC420 IC8H1	37011003	IC LA6510
IC4C1 IC505	37011068	IC UPC4558C (OP AMP)
IC701	37011355	IC M52348SP
IC711	37011356	IC M52722SP
IC951	37011363	IC M52723SP
IC5L1	37051034	MOS UPD4040BC (COUNT)
IC5K2	37051179	IC SN74LS123N (MONO MLT)
IC6A1	37052032	IC SN74LS221N (MULTIVIB)
IC7E1	37052064	IC HD74LS08P
IC802	37055537	MOS NM24C04EN
IC5H2 IC661	37056615	IC BA10393
IC5C2 IC5H1 IC502 IC504	37056616	IC BA10358
IC703 IC753	37056812	IC M62362P
IC702	37056814	IC M52035P
IC5C1 IC761 IC771	37056926	IC BA10324A (Q OP-AMP)
IC621	37076081	IC UC3842N
IC531 IC532 IC731 IC752 IC961	37076176	MOS M62393P
IC791	37076298	MOS M35043-052SP
IC7A1	37076303	IC CXA2016S
IC5K1	37076324	MOS HD14046BP
IC8A1	37076328	MOS 24LCS21-I/P
IC721	37076337	IC VPS13
IC801	37076346	MOS UPD78014FYCW-W14

SYMBOL	PARTS NO	DESCRIPTION
*** TRANSISTORS ***		
Q983	350A2001	TR 2SA1038S-TP R
⚠Q5F1	350A2002	TR 2SA1038S-TP S
⚠Q857	350B9962	TR 2SB1328 P-T105
Q985	350B9972	TR 2SB1353 E-T114
Q602	350D7217	TR 2SC945-T Q
Q4E1	350E3217	TR 2SC1740S-T Q
⚠Q2002 Q462 Q464 Q465 Q481 Q5H3 Q5H5 Q551 Q571	350E3218	TR 2SC1740S-T R
Q762	350E8905	TR 2SC1841E-T
Q7E1A	350G1017	TR 2SD2005-T105 Q
Q984	350G2672	TR 2SD2033A E-T114
Q711B Q711G Q711R	350H0200	TR 2SC2407A-T
Q461	350H1811	TR,2SC2901 K-T
Q782	350H4418	TR,2SC1473-TA R
Q702B Q702G Q702R	350J4704	TR 2SC3777-AA D
Q603	350J4818	TR 2SC1473A-TA R
Q5A2 Q5A4 Q742B Q742G Q742R Q855	350J5205	TR 2SC3415S-TP
Q981 Q982	350J5241	TR 2SC2389S-TP R
Q858	350J5242	TR 2SC2389S-TP S
Q987	350J5262	TR 2SC4620 P-TV2
Q101 Q102	350K3517	TR 2SA733/2SA733A-T Q
Q471 Q763 Q764	350K4112	TR 2SA916-T L
Q852	350K4311	TR 2SA953-T K
Q741B Q741G Q741R	350K5218	TR,2SA1018-TA R
Q463 Q5H2 Q5H4 Q5H6 Q552	350K5718	TR 2SA933S-T R
Q555	35025211	TR 2SB546 K
Q761	35056311	TR 2SC2688 K
Q585	35072612	TR 2SD2396 J
⚠Q554	35095120	TR 2SC5047
Q5C1	351B7660	TR 2SK1484-T
⚠Q2001 ⚠Q2003	351G0556	TR DTA114WS-T
Q6A2	351G0557	TR DTA114YS-T
Q5H1 Q583 Q6A3 Q801 Q802 Q851	351G0601	TR DTC114ES-T
Q103 Q104	351G0641	TR DTC114YS-T
Q859	351G0654	TR DTC123JS TP

SYMBOL	PARTS NO	DESCRIPTION
Q6A1	35122600	TR 2SK701
Q5A1 Q5A3	35124500	TR 2SJ196
Q553	35127720	TR IRL1530G
Q591	35127790	TR 2SJ449
⚠Q5P1	35127900	TR 2SK2771-01R
MQ581	35127940	TR SLA5038
⚠Q601 ⚠Q604	35127950	TR 2SK2611
Q581	35128003	TR 2SK2098-01MR(F119)
⚠CR601	35595015	TRIAC AC10FGM
*** DIODES ***		
⚠D2002 D4E1 D462 D463 D5H1 D5H2 D5H3 ⚠D5P3 D571 D58A D581 D591 D6A8 D6F1 D623 D624 D625 D626 D627 D628 D635 D636 D651 D661 D662 D663 D7N1	360K1027	DIODE 1SS132

SYMBOL	PARTS NO	DESCRIPTION
D701B D701G D701R D702B D702G D702R D703B D703G D703R D704B D704G D704R D711 D712 D713 D714 D771 D772 D773 D781 D784 D821 D85A D851 D984	360K1027	DIODE 1SS132
D471 D721B D721G D721R D722B D722G D722R D741B D741G D741R D762 D782 D783	360K1032	DIODE 1SS82-TA
D461 D6A9	360K1033	DIODE 1SS131,AT52
ZD602 ZD625	360K3098	DIODE RD12EB(3)-T4
ZD624	360K3117	DIODE RD39EB(4)-T4
ZD761	360K3170	DIODE RD6.2JSB(2)/JSAB(2)
ZD601	360K3186	DIODE RD22EB(1)-T4
ZD7E1B	360K3428	DIODE RD7.5JS AB3-T4
ZD623	360K3602	DIODE RD2.0ESB(1)-T4
ZD5A1	360K3605	DIODE RD2.2ES B1-T4
ZD5H1 ZD981	360K3626	DIODE RD4.3ESB(1)-T4
ZD5H2	360K3630	DIODE RD4.7ESB(1)-T4
ZD4A1 ZD821	360K3635	DIODE RD5.1ESB(2)-T4
ZD762	360K3636	DIODE RD5.1ESB(3)-T4
ZD661 ZD7A1 ZD7A2 ZD7A3 ZD7A4 ZD751 ZD752 ZD8A1 ZD8A2	360K3639	DIODE RD5.6ESB(2)-T4
ZD571 ZD801 ZD802	360K3642	DIODE RD6.2ES AB1-T4
ZD629	360K3643	DIODE RD6.2ES AB2-T4
ZD551	360K3647	DIODE RD6.8ESB(2)-T4
ZD6A1	360K3652	DIODE RD7.5ESB(3)-T4
ZD5A2 ZD5A3 ZD591	360K3658	DIODE RD9.1ESB(1)-T4
ZD721	360K3660	DIODE RD9.1ESB(3)-T4
ZD603	360K3663	DIODE RD10ESB(2)-T4
ZD4E2	360K3670	DIODE RD12ES AB1-T4
ZD662 ZD771	360K3671	DIODE RD12ES AB2-T4
⚠ZD2001	360K3694	DIODE RD22ES AB1-T4
ZD627	360K3697	DIODE RD22ESB
ZD4E1	360K3717	DIODE RD33ES AB4-T4

SYMBOL	PARTS NO	DESCRIPTION
D602	361K7174	DIODE RU1P V1
D608 D609	361K7523	DIODE ERA15-04V1
⚠D2001 D5C1 D5C2 ⚠D5G1	361K7562	DIODE EGP10G G23
D6A6 D603 D606 D607 D610 D629	361K7570	DIODE DINL20
D6F2	361K7769	DI 1SS290 T-72
D6A2	*36107320*	*DIODE FMG-G26S*
D6A4 D6A7	36107352	DIODE RL2Z-LFC4
D6A5	36107526	DIODE,RM1,LF-B2
D6A3	36107729	DIODE YG901C2
⚠D5P2	36107758	DIODE ERD37-10E
⚠D5P1 D6A1	36107760	DIODE FMG-G2CS
D593	36107770	DIODE ERC90M-03(5A)
D551	36107771	DIODE FE5DL-6596
⚠D553 ⚠D554	36107774	DIODE RG2A2(LF-A1)
D552	36107775	DIODE RX3Z(LF014-102)
⚠D555	36108250	DIODE FMQ-G5FS
⚠MD5P1	36108254	DIODE ESAC39M-04D F77
LED101	36801021	LED SML19416W-LF38
LED601	36801397	LED SEL1915CAM-LF58(C,D)
⚠D601	36808230	DIODE RBV-1506
D401 D5A1 D761	369K2136	DIODE RGP10G,AT
⚠TH601	38112071	POSISTOR (PTH451A180M270A
⚠TH602	38112072	POSISTOR (PTH451ABG3R0Q14
⚠PC603	38200354	PHOTOCOUPLER PC123FY2
⚠PC601 ⚠PC602	38200355	PHOTOCOUPLER TLP721F

*** TRANSFORMERS ***

SYMBOL	PARTS NO	DESCRIPTION
T551	45804025	TRANS,H.DRAIVE (W492)
T981	45950003	D.F.TRANS
⚠L583	46204004	COIL,CHOKE 4MH
L592	46206016	COIL,CHOKE 4MH
⚠*T601*	*46318105*	*SWITCHING TRANS W480*
⚠T602	46701002	TRANS,PULSE

SYMBOL	PARTS NO	DESCRIPTION
L6A6	610G0257	COIL,CHOKE 33UH
⚠FL602	61062204	LINE FILTER (HR-24-E392)
⚠FL603	61062209	LINE FILTER (HR-28-E702)
L6A1	61099096	FILTER CHOKE 68UH K 1R5
LC902	616K6028	NOISE FILTER 1H223X-TA
LC7A1 LC7A2 LC7A3 LC7A4	616K6942	NOISE FILTER FILMAC TU20M
LC471 LC703 LC711 LC721 LC731 LC761 LC762 LC763 LC764 LC901	616K6946	NOISE FILTER TH28123MA
LC702B LC702G LC702R	616K6964	NOISE FILTER TX07250NBT
LC701B LC701G LC701R LC713	616K6965	NOISE FILTER TX09500NBT
LC741	*616K6966*	*NOISE FILTER*

*** PWB ASSYS ***

SYMBOL	PARTS NO	DESCRIPTION
	84R69A01	SW MAIN PWB ASSY
	84R69C01	VIDEO PWB ASSY
	84R69D03	DEF PWB ASSY

*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***

SYMBOL	PARTS NO	DESCRIPTION
HD555	31709503	SHEET,INSULATOR
HQ554	31709507	SHEET,INSULATOR HEAT SINK
SG901B SG901G SG901R SG902	329J0214	ARRESTER(200V),AT52
	32990205	INSUIATING CAP TIC-3.5(
	32990234	BNC/D-SUB PANEL
X801	64098039	X'TAL(10.000MHZ)
⚠F601	66699064	FUSE UL(ET) 250V 4A
SG903 ⚠SG951	667K6007	SPARK GAP 1.5KV
CN-CRT	70032058	CRT SOCKET(HPS0440)
IN601	70521064	AC RECEPTACLE
CORD	70810774	POWER CORD U-3 L1.8 GRY
CABLE	73893226	SIGNAL CABLE D15P-MD15P K
⚠ICD5P1	79644121	HV CONTROL UNIT
⚠IC2001	79644181	HV PROTECTOR

SYMBOL	PARTS NO	DESCRIPTION
⚠T5R1	47105709	FBT
⚠T561	47710020	TRANS,H.OUTPUT(W422)

*** VARIABLE RESISTORS ***

SYMBOL	PARTS NO	DESCRIPTION
VR582	410G1407	R,VARIABLE B1K
VR7E1	*410G1412*	*R,VARIABLE B6.8K-T*
VR401	410G1415	R,VARIABLE B22K-T
⚠VR5R1	415K5163	R,VARIABLE B200K
VR6A1	41505153	R,VARIABLE B500

*** RELAYS & SWITCHES ***

SYMBOL	PARTS NO	DESCRIPTION
SW582	65161081	SWITCH SLIDE 00220867
⚠SW601	65360060	PUSH SWITCH ESB91631AXL
SW108	65360067	PUSH SWITCH ESB30
SW101 SW102 SW103 SW104 SW105 SW106 SW107	65361012	PUSH SWITCH
⚠RL581	65660045	RELAY DSBT2-M-2D-DC12V
RL851	65660046	RELAY OSA-SS-212DM5
⚠RL601 ⚠RL602	65690001	RELAY G5P-1

*** COILS & FILTERS ***

SYMBOL	PARTS NO	DESCRIPTION
LC791 LC791B LC791G LC791R	390J9027	FILTER ZJSC-R12-100TA
MRC801 MRC802	39040002	RC,NETWORK 10K 1K 0.01UF
MRC803	*39040003*	*RC,NETWORK 1K 0.01UF*
MRC581	39099069	ARCL11S101J104Z
⚠L581	60919175	COIL,H.LIN 20T
L791	610E1711	COIL,FILTER 3.3UH
L602	610E1722	COIL,FILTER 27UH
L701B L701G L701R	610E1726	COIL,FILTER 56UH
L591 L593 L761	610F3025	COIL,FILTER 47UH
⚠L584	610F3041	COIL,FILTER 1000UH
L6A7 L6A8 L6A9 L6E1	610F5002	FERRITE BEADS (B-02-RT)
L901B L901G L901R	610F6503	COIL,FILTER 0.15UH
L601 L604	610G0111	INDUCTOR,BEADS(FBR07HA121
⚠L5P1	610G0233	FILTER CHOKE PJ8T-470K
⚠L5P2	610G0242	FILTER CHOKE PJ8T-100M
L6A2 L6A3 L6A5	610G0257	COIL,CHOKE 33UH

SYMBOL	PARTS NO	DESCRIPTION

*** APPEARANCE PARTS ***

SYMBOL	PARTS NO	DESCRIPTION
	25319621	CABINET FRONT ASSY(AG)
	25319641	CABINET BACK
	25427941	REVOLVING STAND ASSY
	25546391	CHASSIS BASE
	25757643	LABEL(REV.)
	25785041	NAME PLATE,INSTRUCTION
	25852641	SCREW,SPECIAL(5*25)

*** PRINTED & PACKING MATERIALS ***

SYMBOL	PARTS NO	DESCRIPTION
	24813191	BAG,POLYETHYLENE(150*370)
	25833101	CARTON BOX(JC-2145UMA)
	25833481	FILLER(T),CARTON
	25833491	FILLER(B),CARTON
	25833831	SHEET PROTECTION
	25846051	PLATE,PULL OUT(CN510)
	78131621	P1150(A) USER'S MANUAL
	78131671	P1150 QUICK START GUIDE

*** RESISTORS ***

SYMBOL	PARTS NO	DESCRIPTION
J35 J62 J63	40AAD100	R,CHIP 0.0H 5% 1/2W
R443	40AAD124	R,CHIP 9.1H 5% 1/2W
R904	40AAD133	R,CHIP 22H 5% 1/2W
R425	40AAD141	R,CHIP 47H 5% 1/2W
R716B R716G R716R	40AAD161	R,CHIP 330H 5% 1/2W
R724	40AAD163	R,CHIP 390H 5% 1/2W
R709B R709G R709R	40AAD169	R,CHIP 680H 5% 1/2W
R50M	40AAD181	R,CHIP 2.2K 5% 1/2W
R784	40AAD221	R,CHIP 100K 5% 1/2W
J005 J006 J007 J10 J11 J14 J15 J16 J17 J18 J19 J20 J21 J22 J23 J25 J27 J28 J29 J3 J30 J31 J32 J4 J5 J51 J52 J53 J54 J55 J56 J57 J58	40AA1000	R,CHIP 0H 5% 1/8W

SYMBOL			PARTS NO	DESCRIPTION
J59	J6	J60	40AA1000	R,CHIP 0H 5% 1/8W
J61	J64	J65		
J66	J67	J68		
J69	J70	J71		
J72	J73	J74		
J81				
R58P			40AA1165	R,CHIP 470H 5% 1/8W
R527			40AA1173	R,CHIP 1.0K 5% 1/8W
R58R			40AA1209	R,CHIP 33K 5% 1/8W
R529			40AA1215	R,CHIP 56K 5% 1/8W
R430	R445	R8H8	40AA2005	R,CHIP 2.2H 5% 1/4W
R8J6				
R672	R674		40AA2149	R,CHIP 100H 5% 1/4W
R648			40AA2151	R,CHIP 120H 5% 1/4W
R7E2A	R714B	R714G	40AA2161	R,CHIP 330H 5% 1/4W
R714R				
R7E3A			40AA2167	R,CHIP 470H 5% 1/4W
R70EB	R70EG	R70ER	40AA2169	R,CHIP 680H 5% 1/4W
R706B	R706G	R706R		
R769	R772	R773	40AA2173	R,CHIP 1.0K 5% 1/4W
R744B	R744G	R744R	40AA2209	R,CHIP 33K 5% 1/4W
R743B	R743G	R743R	40AA2219	R,CHIP 82K 5% 1/4W
R742B	R742G	R742R	40AA2227	R,CHIP 180K 5% 1/4W
R741B	R741G	R741R	40AA2229	R,CHIP 220K 5% 1/4W
R746			40AA2233	R,CHIP 330K 5% 1/4W
R7G3	R7G8	R70G	40AA3000	R,CHIP 0.0H 5% 1/10W
R70K	R70L	R70M		
R703B	R703G	R703R		
R704B	R704G	R704R		
R732	R733	R75K		
R75L	R75P	R75R		
R75T	R793	R794		
R795	R966			
R431	R446		40AA3109	R,CHIP 2.2H 5% 1/10W
R58N	R638	R8J2	40AA3125	R,CHIP 10H 5% 1/10W
R8H4			40AA3129	R,CHIP 15H 5% 1/10W
R70FB	R70FG	R70FR	40AA3133	R,CHIP 22H 5% 1/10W
R646	R647		40AA3135	R,CHIP 27H 5% 1/10W
R639	R722B	R722G	40AA3137	R,CHIP 33H 5% 1/10W
R722R				
R50H			40AA3141	R,CHIP 47H 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R7N2	R7N5	R71K	40AA3181	R,CHIP 2.2K 5% 1/10W
R797				
R665	R7E2B		40AA3183	R,CHIP 2.7K 5% 1/10W
R520	R6G3	R7H5	40AA3185	R,CHIP 3.3K 5% 1/10W
R7H6	R7H7	R7H8		
R85H	R85K	R85L		
R85M	R85N	R85P		
R796			40AA3187	R,CHIP 3.9K 5% 1/10W
R5L6	R50L	R6F2	40AA3189	R,CHIP 4.7K 5% 1/10W
R6F6	R7N6	R70N		
R75N				
R785			40AA3191	R,CHIP 5.6K 5% 1/10W
R753			40AA3193	R,CHIP 6.8K 5% 1/10W
R6G4			40AA3195	R,CHIP 8.2K 5% 1/10W
R5K0	R5K8	R5K9	40AA3197	R,CHIP 10K 5% 1/10W
R5L3	R5L4	R50G		
R50J	R534	R6F8		
R622	R623	R624		
R627	R629	R630		
R633	R634	R642		
R644	R649	R661		
R663	R664	R667		
R668	R7E3	R7E5		
R7F2	R7G1	R7G2		
R7N7	R70H	R707B		
R707G	R707R	R75M		
R752	R771	R774		
R775	R781	R782		
R783	R788	R79A		
R798	R8A5	R8A6		
R8A7	R8A9	R964		
R982				
R405	R625		40AA3201	R,CHIP 15K 5% 1/10W
R5L7			40AA3204	R,CHIP 20K 5% 1/10W
R6F7	R7E1	R7N8	40AA3205	R,CHIP 22K 5% 1/10W
R50K	R8A2		40AA3207	R,CHIP 27K 5% 1/10W
R523	R6F9	R650	40AA3209	R,CHIP 33K 5% 1/10W
R7A9				
R626			40AA3211	R,CHIP 39K 5% 1/10W
R7N3	R7N4	R79E	40AA3213	R,CHIP 47K 5% 1/10W
R8A1	R8A8			
R632			40AA3215	R,CHIP 56K 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R7K2	R7K4		40AA3143	R,CHIP 56H 5% 1/10W
R70AB	R70AG	R70AR	40AA3145	R,CHIP 68H 5% 1/10W
R8A3	R8A4		40AA3146	R,CHIP 75H 5% 1/10W
R512	R628	R635	40AA3149	R,CHIP 100H 5% 1/10W
R7A5	R7A6	R7A7		
R7A8	R705B	R705G		
R705R	R725B	R725G		
R725R				
R708B	R708G	R708R	40AA3151	R,CHIP 120H 5% 1/10W
R715B	R715G	R715R		
R717B	R717G	R717R		
R518			40AA3153	R,CHIP 150H 5% 1/10W
R7F1			40AA3159	R,CHIP 270H 5% 1/10W
R6F3	R7H1	R7H2	40AA3161	R,CHIP 330H 5% 1/10W
R7H3	R7H4			
R6F1			40AA3163	R,CHIP 390H 5% 1/10W
R522	R526	R671	40AA3167	R,CHIP 560H 5% 1/10W
R7G7			40AA3169	R,CHIP 680H 5% 1/10W
R426	R5K1	R5K2	40AA3173	R,CHIP 1.0K 5% 1/10W
R5K3	R5L1	R501		
R502	R503	R504		
R505	R506	R508		
R509	R511	R515		
R521	R528	R531		
R532	R6G2	R645		
R666	R7E4	R7F7		
R7F8	R7F9	R7N1		
R71E	R71G	R71H		
R71LB	R71LG	R71LR		
R731	R745B	R745G		
R745R	R75A	R75E		
R75F	R75G	R75H		
R754	R756	R757		
R758	R759	R799		
R961	R974	R981		
R525	R7E2E	R7K1	40AA3175	R,CHIP 1.2K 5% 1/10W
R7K3				
R71F			40AA3177	R,CHIP 1.5K 5% 1/10W
R641	R901B	R901G	40AA3179	R,CHIP 1.8K 5% 1/10W
R901R				
R637	R643	R669	40AA3181	R,CHIP 2.2K 5% 1/10W
R7E6	R7F6	R7G6		

SYMBOL			PARTS NO	DESCRIPTION
R620			40AA3217	R,CHIP 68K 5% 1/10W
R621	R631		40AA3223	R,CHIP 120K 5% 1/10W
R6F4			40AA3229	R,CHIP 220K 5% 1/10W
R7A1	R7A2	R7A3	40AA3233	R,CHIP 330K 5% 1/10W
R7A4				
R786	R787		40AA3242	R,CHIP 750K 5% 1/10W
R636	R662		40AA3245	R,CHIP 1.0M 5% 1/10W
R50E			40AB1179	R,CHIP 1.8K 1% 1/8W
R427			40AB2128	R,CHIP 13H 1% 1/4W
R701B	R701G	R701R	40AB2146	R,CHIP 75H 1% 1/4W
R702B	R702G	R702R		
R475			40AB2187	C,CER,CHIP 3.9K 1% 1/4W
R8J5			40AB3126	R,CHIP 11H 1% 1/10W
R8H7			40AB3131	R,CHIP 18H 1% 1/10W
R712			40AB3145	R,CHIP 68H 1% 1/10W
R514			40AB3149	R,CHIP 100H 1% 1/10W
R718			40AB3155	R,CHIP 180H 1% 1/10W
R71A			40AB3161	R,CHIP 330H 1% 1/10W
R510			40AB3166	R,CHIP 510H 1% 1/10W
R50A			40AB3167	R,CHIP 560H 1% 1/10W
R984			40AB3171	R,CHIP 820H 1% 1/10W
R51G	R517		40AB3175	R,CHIP 1.2K 1% 1/10W
R52A			40AB3177	R,CHIP 1.5K 1% 1/10W
R422	R52E	R713	40AB3179	R,CHIP 1.8K 1% 1/10W
R516	R76A	R76F	40AB3180	R,CHIP 2.0K 1% 1/10W
R6F5	R792		40AB3182	R,CHIP 2.4K 1% 1/10W
R7G4	R719		40AB3183	R,CHIP 2.7K 1% 1/10W
R5L2			40AB3189	R,CHIP 4.7K 1% 1/10W
R7G5			40AB3191	R,CHIP 5.6K 1% 1/10W
R76E			40AB3192	R,CHIP 6.2K 1% 1/10W
R640	R969		40AB3193	R,CHIP 6.8K 1% 1/10W
R51H			40AB3194	R,CHIP 7.5K 1% 1/10W
R51A	R7F5		40AB3195	R,CHIP 8.2K 1% 1/10W
R519			40AB3196	R,CHIP 9.1K 1% 1/10W
R401	R403	R5K5	40AB3197	R,CHIP 10K 1% 1/10W
R51F				
R421	R95A	R951	40AB3198	R,CHIP 11K 1% 1/10W
R963				
R7F4			40AB3199	R,CHIP 12K 1% 1/10W
R5K6	R51K	R7F3	40AB3200	R,CHIP 13K 1% 1/10W

SYMBOL	PARTS NO	DESCRIPTION
R5K7	40AB3201	R,CHIP 15K 1% 1/10W
R513	40AB3203	R,CHIP 18K 1% 1/10W
R424 R442 R8H6 R8J4	40AB3204	R,CHIP 20K 1% 1/10W
R7K5	40AB3205	R,CHIP 22K 1% 1/10W
R5L8	40AB3206	R,CHIP 24K 1% 1/10W
R51E	40AB3208	R,CHIP 30K 1% 1/10W
R5K4 R952 R953 R954 R955	40AB3209	R,CHIP 33K 1% 1/10W
R670	40AB3211	R,CHIP 39K 1% 1/10W
R402 R404	40AB3212	R,CHIP 43K 1% 1/10W
R962	40AB3213	R,CHIP 47K 1% 1/10W
R423 R441 R8H3 R8J1	40AB3214	R,CHIP 51K 1% 1/10W
R471	40AB3215	R,CHIP 56K 1% 1/10W
R472	40AB3218	R,CHIP 75K 1% 1/10W
R473 R474	40AB3225	R,CHIP 150K 1% 1/10W
R58L	40AC3129	R,CHIP 15H 5% 1W
R58M	40AC3131	R,CHIP 18H 5% 1W
R6G1	40AD4231	R,CHIP 270K 0.5% 1/10W
R6G0	40AD4247	R,CHIP 1.2M 0.5% 1/10W
R411	401CF601	R,CARBON 1.0H 5% 1/4W
R903	401CF649	R,CARBON 100H 5% 1/4W
R993	401CF693	R,CARBON 6.8K 5% 1/4W
R765	401CF699	R,CARBON 12K 5% 1/4W
R612 R615	401CF729	R,CARBON 220K 5% 1/4W
R682	401CF731	R,CARBON 270K 5% 1/4W
R684	401CF733	R,CARBON 330K 5% 1/4W
R85G	401CF755	R,CARBON 2.7M 5% 1/4W
R411	401C6601	R,CARBON 1.0H 5% 1/4W
⚠R5P4 ⚠R5P5	401C6633	R,CARBON 22H 5% 1/4W
R591	401C6641	R,CARBON 47H 5% 1/4W
R850	401C6643	R,CARBON 56H 5% 1/4W
R903	401C6649	R,CARBON 100H 5% 1/4W
R6A7	401C6657	R,CARBON 220H 5% 1/4W
R466 R905	401C6689	R,CARBON 4.7K 5% 1/4W
R993	401C6693	R,CARBON 6.8K 5% 1/4W
R617	401C6697	R,CARBON 10K 5% 1/4W
R765	401C6699	R,CARBON 12K 5% 1/4W
R5B1 R5B4	401C6727	R,CARBON 180K 5% 1/4W

SYMBOL	PARTS NO	DESCRIPTION
R462 R5E1 R5E3 R6E8	401K5689	R,CARBON 4.7K 5% 1/6W
R5A7	401K5691	R,CARBON 5.6K 5% 1/6W
R4A9 R4C1 R467 R5H2 R592	401K5695	R,CARBON 8.2K 5% 1/6W
⚠R2003 R4E1 R4E3 R5A3 R5B2 R5B3 R5H4 R5H5 R5H6 R611 R683 R808 R809 R831 R832 R841 R846 ⚠R85A R851 R857	401K5697	R,CARBON 10K 5% 1/6W
R5A4	401K5699	R,CARBON 12K 5% 1/6W
⚠R2005 R6E2	401K5705	R,CARBON 22K 5% 1/6W
⚠R2004	401K5707	R,CARBON 27K 5% 1/6W
R5A9 R5B5 R828	401K5713	R,CARBON 47K 5% 1/6W
R761	401K5717	R,CARBON 68K 5% 1/6W
R70NA ⚠R85C	401K5719	R,CARBON 82K 5% 1/6W
⚠R2002 R5A2 R6H1 R608 R766 R85E R85F	401K5721	R,CARBON 100K 5% 1/6W
R990	401K5733	R,CARBON 330K 5% 1/6W
⚠R5F3	401K5735	R,CARBON 390K 5% 1/6W
R5H3	401K5737	R,CARBON 470K 5% 1/6W
R58A R58C R584 R586 R588 R589	401K5739	R,CARBON 560K 5% 1/6W
R5A6	401K5745	R,CARBON 1.0M 5% 1/6W
R618	40216282	R,WIRE 10W 1.0H
⚠R602	40299144	R,WIRE 15H 5% 7W
R410	403F1101	R,METAL OXIDE 1H 5% 1W
R555	403F1149	R,METAL OXIDE 100H 5% 1W
R8J3	403F2147	R,METAL OXIDE 82H 5% 2W
R8H5	403F2151	R,METAL OXIDE 120H 5% 2W
R991	403F2215	R,METAL OXIDE 56K 5% 2W
R563	40371125	R,METAL 10H 5% 1W
R6E1	40371131	R,METAL 18H 5% 1W
R553	40371133	R,METAL 22H 5% 1W
R6A2	40371135	R,METAL 27H 5% 1W
R575	40371187	R,METAL 3.9K 5% 1W
R476	40371211	R,METAL 39K 5% 1W

SYMBOL	PARTS NO	DESCRIPTION
R612 R615	401C6729	R,CARBON 220K 5% 1/4W
R682	401C6731	R,CARBON 270K 5% 1/4W
R684	401C6733	R,CARBON 330K 5% 1/4W
R680 R685	401C6745	R,CARBON 1.0M 5% 1/4W
R85G	401C6755	R,CARBON 2.7M 5% 1/4W
⚠R985 ⚠R986	401G6141	R,CARBON 47H 5% 1/4W
R762	401G6189	R,CARBON 4.7K 5% 1/4W
⚠R5F2	401G6191	R,CARBON 5.6K 5% 1/4W
R564	401H5617	R,CARBON 4.7H 5% 1/2W
R902B R902G R902R	401H5633	R,CARBON 22H 5% 1/2W
R673	401H5647	R,CARBON 82H 5% 1/2W
R4A1	401H5663	R,CARBON 390H 5% 1/2W
R409	401H5675	R,CARBON 1.2K 5% 1/2W
⚠R995	401H5677	R,CARBON 1.5K 5% 1/2W
R461	401H5689	R,CARBON 4.7K 5% 1/2W
R859	401H5723	R,CARBON 120K 5% 1/2W
R601	401H5737	R,CARBON 470K 5% 1/2W
R711B R711G R711R	401JJ820	R,CARBON 0.0H
R711B R711G R711R R806 R987	401J9820	R,CARBON 0.0H
R593	401K5609	R,CARBON 2.2H 5% 1/6W
R989	401K5617	R,CARBON 4.7H 5% 1/6W
R552 R6E3	401K5625	R,CARBON 10H 5% 1/6W
R551 R58D	401K5649	R,CARBON 100H 5% 1/6W
R821	401K5653	R,CARBON 150H 5% 1/6W
R107	401K5655	R,CARBON 180H 5% 1/6W
R801 R802	401K5663	R,CARBON 390H 5% 1/6W
R468 R469	401K5665	R,CARBON 470H 5% 1/6W
R108 R109 R481 R482 R484 R5E2 R576 R577 R80A R807 R833 R844 R847	401K5673	R,CARBON 1.0K 5% 1/6W
R848	401K5675	R,CARBON 1.2K 5% 1/6W
R558	401K5677	R,CARBON 1.5K 5% 1/6W
R408 R463 R483 R5C9 R574 R852	401K5679	R,CARBON 1.8K 5% 1/6W
R5H1 R616	401K5681	R,CARBON 2.2K 5% 1/6W
R803 R804	401K5683	R,CARBON 2.7K 5% 1/6W
R5H7	401K5685	R,CARBON 3.3K 5% 1/6W

SYMBOL	PARTS NO	DESCRIPTION
⚠R5P3	40371331	R,METAL 0.27 5% 1W
⚠R5F1	40371343	R,METAL 0.82H 5% 1W
R860	40372111	R,METAL 2.7H 5% 2W
R7E1A	40372119	R,METAL 5.6H 5% 2W
R829	40372121	R,METAL 6.8H 5% 2W
R7E1B	40372129	R,METAL 15H 5% 2W
⚠R583	40372131	R,METAL 18H 5% 2W
R610	40372143	R,METAL 56H 5% 2W
R464	40372169	R,METAL 680H 5% 2W
R6A3 R6A4 R6E9	40372199	R,METAL 12K 5% 2W
R605 R606	40372213	R,METAL 47K 5% 2W
R6A6 R6A9	40372221	R,METAL 100K 5% 2W
R609	40373159	R,METAL 270H 5% 3W
R603 R604	40373211	R,METAL 39K 5% 3W
R607	40373333	R,METAL 0.33H 5% 3W
⚠R5P1 ⚠R5P2	40376151	R,METAL120H 5% 3W
R444	40378143	R,METAL 56H 5% 2W
⚠R581	40383028	R,METAL 180H 5% 3W
R554	40399092	R,METAL 1.2H 5% 5W
R110 R111	404CA670	R,METAL 750H 1% 1/6W
R407	404CA682	R,METAL 2.4K 1% 1/6W
R406	404CA696	R,METAL 9.1K 1% 1/6W
R767	404CA726	R,METAL 160K 1% 1/6W
R614	404CA741	R,METAL 680K 1% 1/6W
R613	404CA743	R,METAL 820K 1% 1/6W
R992	404C1669	R,METAL 680H 1% 1/6W
R110 R111	404C1670	R,METAL 750H 1% 1/6W
R407	404C1682	R,METAL 2.4K 1% 1/6W
R5A1	404C1683	R,METAL 2.7K 1% 1/6W
R6E7	404C1684	R,METAL 3.0K 1% 1/6W
R6E5 R6E6	404C1691	R,METAL 5.6K 1% 1/6W
R406	404C1696	R,METAL 9.1K 1% 1/6W
R4A3 R4A6 R4A7 R5C2 R556	404C1697	R,METAL 10K 1% 1/6W
R5C4	404C1699	R,METAL 12K 1% 1/6W
R5A8	404C1700	R,METAL 13K 1% 1/6W
⚠R5R1 R768	404C1701	R,METAL 15K 1% 1/6W
R5A5 R560	404C1702	R,METAL 16K 1% 1/6W
R5C3	404C1703	R,METAL 18K 1% 1/6W
R5C6	404C1705	R,METAL 22K 1% 1/6W

SYMBOL	PARTS NO	DESCRIPTION
R5C8	404C1707	R,METAL 27K 1% 1/6W
R561	404C1708	R,METAL 30K 1% 1/6W
R4A8	404C1711	R,METAL 39K 1% 1/6W
R5C5 R681	404C1715	R,METAL 56K 1% 1/6W
⚠R5R2 ⚠R5R6 R686	404C1717	R,METAL 68K 1% 1/6W
R4A5 R6E4 R763	404C1719	R,METAL 82K 1% 1/6W
R5C7 R5R3	404C1721	R,METAL 100K 1% 1/6W
R4A4 R5C1 R764	404C1723	R,METAL 120K 1% 1/6W
R767	404C1726	R,METAL 160K 1% 1/6W
⚠R5R5	404C1729	R,METAL 220K 1% 1/6W
R614	404C1741	R,METAL 680K 1% 1/6W
R613	404C1743	R,METAL 820K 1% 1/6W
R751	404J9443	R,METAL 1.3K 0.5% 1/8W
⚠R2001 ⚠R562 ⚠R572	404K5109	R,METAL 2.2H 5% 1/4W
⚠R4F1 ⚠R465 ⚠R5G1	404K5125	R,METAL 10H 5% 1/4W
⚠R994		
⚠R5H8	404K5135	R,METAL 27H 5% 1/4W
R619	40405125	R,METAL 10H 5% 1/4W
R983	40499449	R,METAL 10K 2% 1W
R6H2 R6H3 R6H4	40499507	R,METAL 0.22H 5% 1/2W
R594	408A8107	R,FUSE 1.8H 5% 1/2W
⚠R6A8	4081J907	R,FUSE 1.0H 5% 2W

*** CAPACITORS ***

C402 C6F2	42AA1509	C,CHIP CERAMIC 50V 1000PF
C629 C7N2	42AA1515	C,CHIP CERAMIC 50V 3300PF
C409	42AA1516	C,CHIP CERAMIC 50V 3900PF
C631 C792	42AA1517	C,CHIP CERAMIC 50V 4700PF
C5L3	42AA1520	C,CHIP CERAMIC 50V 8200PF
C623 C625 C635	42AA1521	C,CHIP CERAMIC 50V 0.01UF
C630 C632	42AA1523	C,CHIP CERAMIC 50V0.015UF
C751	42AA1527	C,CERAMIC 25V 0.01UF
C791	42AA1538	C,CERAMIC 25V 0.1UF
C624 C626 C628	42AA2721	C,CERAMIC 50V 0.1UF
C633 C636 C661		
C662 C663 C773		
C421 C422 C471	42AA2726	C,CERAMIC 50V 0.01UF
C7F4 C702B C702G		
C702R C704B C704G		
C704R C712B C712G		

SYMBOL	PARTS NO	DESCRIPTION
⚠C581	420C9066	C,CERAMIC 500V 1800PF
C902	420C9551	C,CERAMIC 500V 100PF
C901	420C9557	C,CERAMIC 500V 330PF
C5A6	420C9561	C,CERAMIC 500V 680PF
C5A7	420C9562	C,CERAMIC 500V 820PF
C5A5 C742B C742G	420C9563	C,CERAMIC 500V 1000PF
C742R C761 C985		
C988		
C5A2	420C9565	C,CERAMIC 500V 1500PF
C554	420C9567	C,CERAMIC 500V 2200PF
C552	420C9571	C,CERAMIC 500V 4700PF
C616	420DA014	C,CERAMIC 2KV 150PF
C904	420D0019	C,CERAMIC 2KV 1000PF
⚠C602 ⚠C603 ⚠C605	420EC067	C,CERAMIC 250V 2200PF
⚠C606		
⚠C607 ⚠C608	420EC071	C,CERAMIC 400V 4700PF
C6A5 C611	420JJ088	C,CERAMIC 2K 220PF
C726	420J9118	C,CERAMIC 500V 0.01UF
C903	42040108	C,CERAMIC 2KV 0.01UF
C4A2 C5H2 C808	421A0425	C,CERAMIC 50V 0.01UF
C964		
C5H5 C510	421C0211	C,CERAMIC 50V 680PF
C85C	421C0212	C,CERAMIC 50V 820PF
C80A	421C0213	C,CERAMIC 50V 1000PF
⚠C2004 C4C2 C4C4	421D6009	C,CERAMIC 25V 0.1UF
C403 C405 C5C3		
C5C6 C5C8 C5H3		
C5H4 ⚠C5P6 C58K		
C6F8 C801 C803		
C852 C972		
C5A3	423A1101	C,CERAMIC 50V 470PF
C817 C818	423A2015	C,CERAMIC 50V 10PF
C804 C805	423A2037	C,CERAMIC 50V 47PF
C573 C958 C961	423A2045	C,CERAMIC 50V 100PF
C966		
C462	423A2104	C,CERAMIC 50V 220PF
C989	423E2111	C,CERAMIC 500V 10PF
C5H1 C6F6	427F4601	C,FILM 50V 1000PF
C5K4	427F4602	C,FILM 50V 1200PF
C7F2	427F4607	C,FILM 50V 3300PF

SYMBOL	PARTS NO	DESCRIPTION
C712R C719 C8H4	42AA2726	C,CERAMIC 50V 0.01UF
C8H5 C957 C975		
C982		
C423 C430 C442	42AA2744	C,CERAMIC 25V 0.1UF
C5K0 C5K2 C5K7		
C5K9 C50A C50C		
C50E C50F C50G		
C50P C50Q C501		
C502 C503 C504		
C505 C508 C509		
C513 C516 C521		
C523 C524 C526		
C527 C531 C532		
C7E1 C7E2 C7F5		
C7H1 C7H2 C7H3		
C7H5 C70A C70E		
C70KB C70KG C70KR		
C70PB C70PG C70PR		
C707B C707G C707R		
C708B C708G C708R		
C71A C71EB C71EG		
C71ER C714B C714G		
C714R C715B C715G		
C715R C717B C717G		
C717R C721B C721G		
C721R C732 C743B		
C743G C743R C744B		
C744G C744R C753		
C754 C756 C757		
C758 C759 C76A		
C766 C767 C79G		
C798 C8A2 C8H3		
C8J2 C950 C953		
C954 C965 C971		
C973		
C728B C728G C728R	42CA1416	C,CERAMIC 50V 10PF
C723B C723G C723R	42CA1428	C,CERAMIC 50V 33PF
C71G	42CA1432	C,CERAMIC 50V 47PF
C79F	42CA1438	C,CERAMIC 50V 82PF
C79K	42CA1444	C,CERAMIC 50V 150PF
C50J	42CA1452	C,CHIP 50V 330PF
C85E C85F C85G	42CA1456	C,CERAMIC 50V 470PF
C854 C855 C856		

SYMBOL	PARTS NO	DESCRIPTION
C514 C6F5	427F4609	C,FILM 50V 4700PF
C6A1	427F4617	C,FILM 50V 0.022UF
C467	427F4620	C,FILM 50V 0.039UF
⚠C5R2 C6F1 C614	427F4625	C,FILM 50V 0.1UF
C7A9		
C7A6 C7A7 C7F1	427F4629	C,FILM 50V 0.22UF
C520	427F4651	C,FILM 50V 1000PF
C5K5	427F4693	CQ93M1H471J,BT
⚠C5P4	42703458	C,FILM 630V 3900PF
C7A1 C7A3 C771	428B3013	C,METAL FILM 50V 0.1UF
C5A4	428B3017	C,METAL FILM 50V 0.22UF
C4A3 C5C1	428B3021	C,METAL FILM 50V 0.47UF
C5K3 C5L2	428B3617	C,METAL 50V 0.22UF
C506	428B3619	C,METAL 50V 0.33UF
C5C2	428C9001	C,METAL FILM 100V 0.068UF
C461	428C9022	C,METAL FILM 250V 0.1UF
⚠C5P2	428DE025	C,METAL 100V 1.0UF
C472	428D0081	C,METAL 250V 0.01UF
C465 C724B C724G	428D0097	C,FILM 250V 0.22UF
C724R		
C610	428D0165	C,FILM 400V 0.022UF
C408	428D4317	C,METAL FILM 100V 0.22UF
C591	428D5093	C,METAL 250V 0.1UF
⚠C5P3	42808501	C,METAL FILM 1.6KV 1000PF
⚠C584 ⚠C585	42816354	C,FILM 250V 0.18UF 5%
⚠C586	42816358	C,FILM 250V 0.33UF 5%
⚠C58A	42816360	C,FILM 250V 0.39UF 5%
⚠C589	42816361	C,FILM 250V 0.47UF 5%
⚠C588	42816362	C,FILM 250V 0.56UF 5%
⚠C583	42816378	C,FILM 250V 0.16UF 5%
⚠C587	42816384	C,FILM 250V 0.62UF 5%
⚠C601	42824861	C,FILM 250V 0.47UF
C615	42840241	C,METAL 630V 0.47
C595 C597	42898004	C,METAL 250V 1.5UF
⚠C604 ⚠C613	42899098	C,FILM 250V 0.1UF
⚠C553	42899175	C,METAL 2.0KV 5600P
C7F6	430B6016	C,ELEC 10V 100UF
C7N4 C70T	430B6028	C,ELEC 16V 47UF
C70LB C70LG C70LR	430B6029	C,ELEC 16V 100UF

SYMBOL	PARTS NO	DESCRIPTION
C76F	430B6029	C,ELEC 16V 100UF
C781	430B6030	C,ELEC 16V 220UF
C802	430B6032	C,ELEC 16V 470UF
C7E1A	430B6039	C,ELEC 25V 22UF
C464 C464A C533	430B6041	C,ELEC 25V 47UF
C5C7 C7A8 C7F8	430B6061	C,ELEC 50V 1.0UF
C4A5 C466 C7N3 C70GB C70GG C70GR C70HB C70HG C70HR C70MB C70MG C70MR C986	430B6065	C,ELEC 50V 10UF
C4A1	430B6067	C,ELEC 50V 33UF
C76E	430B6099	C,ELEC 100V 22UF
C782	430B6553	C,ELEC 250V 2.2UF
C476 C70F C705 C706 C8A1	430B8144	C,ELEC 16V 47UF
C709	430B8145	C,ELEC 16V 100UF
C85H C85K C85L C857 C858 C859	430B8177	C,ELEC 50V 3.3UF
C7F7	430B8179	C,ELEC 50V 10UF
⚠C2003 ⚠C5F1 C6E8	430B9016	C,ELEC 10V 100UF
C58P C76H C79E	430B9017	C,ELEC 10V 220UF
C6E7	430B9020	C,ELEC 10V 1000UF
C772	430B9026	C,ELEC 16V 22UF
C713B C713G C713R C752 C765	430B9028	C,ELEC 16V 47UF
C525 C71F	430B9029	C,ELEC 16V 100UF
C722 C76G	430B9030	C,ELEC 16V 220UF
C6E3	430B9033	C,ELEC 16V 1000UF
C622	430B9038	C,ELEC 25V 10UF
C4C3 C425 C426 ⚠C5P5 C50B C50D C612 C952 C955	430B9041	C,ELEC 25V 47UF
C76K C851 C853	430B9042	C,ELEC 25V 100UF
C4C1 C627	430B9043	C,ELEC 25V 220UF
C6E2 C6E5	430B9045	C,ELEC 25V 470UF
C637 C793 C963	430B9061	C,ELEC 50V 1.0UF
C515 C519 C621	430B9062	C,ELEC 50V 2.2UF
C711B C711G C711R	430B9063	C,ELEC 50V 3.3UF
⚠C5R1 C634 C824	430B9065	C,ELEC 50V 10UF

SYMBOL	PARTS NO	DESCRIPTION
C825	430B9065	C,ELEC 50V 10UF
⚠C2001	430B9066	C,ELEC 50V 22UF
C664	430B9069	C,ELEC 50V 100UF
C407	430B9070	C,ELEC 50V 220UF
C404 C406	430B9071	C,ELEC 50V 330UF
C983	430B9085	C,ELEC 63V 47UF
⚠C987	430B9098	C,ELEC 100V 10 UF
C727 C984	430B9101	C,ELEC 100V 47UF
C741B C741G C741R	430B9512	C,ELEC 160V 1.0UF
C764	430B9514	C,ELEC 160V 3.3UF
⚠C5G1 C762	430B9516	C,ELEC 160V 10UF
C5A1	430B9554	C,ELEC 250V 3.3UF
C976	430C0136	C,ELEC 10V 47UF
C5K8 C507 C718B C718G C718R	430C0244	C,ELEC 16V 47UF
C5K1	430C0245	C,ELEC 16V 100UF
C528	430C0261	C,ELEC 35V 4.7UF
C50K	430C0275	C,ELEC 50V 1.0UF
C716B C716G C716R	430C0276	C,ELEC 50V 2.2UF
C956 C974	430C0278	C,ELEC 50V 4.7UF
C512	430C0279	C,ELEC 50V 10UF
C534	430C8522	C,ELEC 25V 330UF
C594	430JH107	C,ELEC 250V 4.7UF
C6E6	4302J046	C,ELEC 25V 1000UF
C6E1 C6E9	4302J047	C,ELEC 25V 2200UF
C6A8	4302J102	C,ELEC 100V 100UF
C6A7	4302J105	C,ELEC 100V 470UF
C6A4	4302J559	C,ELEC 250V 47UF
C6A3	4302J560	C,ELEC 250V 100UF
C745	43029518	C,ELEC 160V 33UF
C592	43029558	C,ELEC 250V 33UF
C551	43049048	C,ELEC 35V 1000UF
⚠C5P1	4309J196	C,ELEC 100V 120UF
C593	43099232	C,ELEC 250V 10UF
⚠C609	43113184	C,ELEC 400V 560UF M
C7H6B C7H6G C7H6R C70RB C70RG C70RR	433A4027	C,ELEC 16V 220UF
C981	433A4033	C,ELEC 25V 10UF
C7A2 C7A5	433A4056	C,ELEC 50V 2.2UF
C701B C701G C701R	433A6147	C,ELEC 16V 47UF

SYMBOL	PARTS NO	DESCRIPTION
C703B C703G C703R	433A6147	C,ELEC 16V 47UF
C7A4	433A6179	C,ELEC 50V 2.2UF
⚠C2002	433A7002	C,ELEC 10V 47UF
C522	433A7013	C,ELEC 16V 47UF
⚠C58M C58R	433A7014	C,ELEC 16V 100UF
C4A6	433A7046	C,ELEC 50V 10UF

REPLACEMENT PARTS LIST

The components specified for Model JC-2145UMB

Note: The components identified by ⚠ make are critical for safety.
Replace only with parts Number specified.

SYMBOL	PARTS NO	DESCRIPTION
*** CRT & TUNER ***		
⚠CRT	33021512	CRT M50LJG79X27
*** ICS ***		
IC6F1	370A1009	IC UPC1093J-T (REG)
IC952	37005085	IC UPC78L12J
IC851	37005193	IC PQ12RF11 (REG)
IC503	37005221	IC UPC78M09AHF
IC803	37005277	IC PQ05RR13 (REG)
IC401	37006022	IC LA7846N
IC501	37009036	IC UPC1883ACT
IC751	37010007	IC M52324P
IC4A1	37010008	IC CA0007AD
IC420 IC8H1	37011003	IC LA6510
IC4C1 IC505	37011068	IC UPC4558C (OP AMP)
IC701	37011355	IC M52348SP
IC711	37011356	IC M52722SP
IC951	37011363	IC M52723SP
IC5L1	37051034	MOS UPD4040BC (COUNT)
IC5K2	37051179	IC SN74LS123N (MONO MLT)
IC6A1	37052032	IC SN74LS221N (MULTIVIB)
IC7E1	37052064	IC HD74LS08P
IC802	37055537	MOS NM24C04EN
IC5H2 IC661	37056615	IC BA10393
IC5C2 IC5H1 IC502 IC504	37056616	IC BA10358
IC703 IC753	37056812	IC M62362P
IC702	37056814	IC M52035P
IC5C1 IC761 IC771	37056926	IC BA10324A (Q OP-AMP)
IC621	37076081	IC UC3842N
IC531 IC532 IC731 IC752 IC961	37076176	MOS M62393P
IC791	37076298	MOS M35043-052SP
IC7A1	37076303	IC CXA2016S
IC5K1	37076324	MOS HD14046BP
IC8A1	37076328	MOS 24LCS21-I/P
IC721	37076337	IC VPS13
IC801	37076346	MOS UPD78014FYCW-W14

SYMBOL	PARTS NO	DESCRIPTION
*** TRANSISTORS ***		
Q983	350A2001	TR 2SA1038S-TP R
⚠Q5F1	350A2002	TR 2SA1038S-TP S
⚠Q857	350B9962	TR 2SB1328 P-T105
Q985	350B9972	TR 2SB1353 E-T114
Q602	350D7217	TR 2SC945-T Q
Q4E1	350E3217	TR 2SC1740S-T Q
⚠Q2002 Q462 Q464 Q465 Q481 Q5H3 Q5H5 Q551 Q571	350E3218	TR 2SC1740S-T R
Q762	350E8905	TR 2SC1841E-T
Q7E1A	350G1017	TR 2SD2005-T105 Q
Q984	350G2672	TR 2SD2033A E-T114
Q711B Q711G Q711R	350H0200	TR 2SC2407A-T
Q461	350H1811	TR,2SC2901 K-T
Q782	350H4418	TR,2SC1473-TA R
Q702B Q702G Q702R	350J4704	TR 2SC3777-AA D
Q603	350J4818	TR 2SC1473A-TA R
Q5A2 Q5A4 Q742B Q742G Q742R Q855	350J5205	TR 2SC3415S-TP
Q981 Q982	350J5241	TR 2SC2389S-TP R
Q858	350J5242	TR 2SC2389S-TP S
Q987	350J5262	TR 2SC4620 P-TV2
Q101 Q102	350K3517	TR 2SA733/2SA733A-T Q
Q471 Q763 Q764	350K4112	TR 2SA916-T L
Q852	350K4311	TR 2SA953-T K
Q741B Q741G Q741R	350K5218	TR,2SA1018-TA R
Q463 Q5H2 Q5H4 Q5H6 Q552	350K5718	TR 2SA933S-T R
Q555	35025211	TR 2SB546 K
Q761	35056311	TR 2SC2688 K
Q585	35072612	TR 2SD2396 J
⚠Q554	35095120	TR 2SC5047
Q5C1	351B7660	TR 2SK1484-T
⚠Q2001 ⚠Q2003	351G0556	TR DTA114WS-T
Q6A2	351G0557	TR DTA114YS-T
Q5H1 Q583 Q6A3 Q801 Q802 Q851	351G0601	TR DTC114ES-T
Q103 Q104	351G0641	TR DTC114YS-T
Q859	351G0654	TR DTC123JS TP

SYMBOL	PARTS NO	DESCRIPTION
Q6A1	35122600	TR 2SK701
Q5A1 Q5A3	35124500	TR 2SJ196
Q553	35127720	TR IRLI530G
Q591	35127790	TR 2SJ449
⚠Q5P1	35127900	TR 2SK2771-01R
MQ581	35127940	TR SLA5038
⚠Q601 ⚠Q604	35127950	TR 2SK2611
Q581	35128003	TR 2SK2098-01MR(F119)
⚠CR601	35595015	TRIAC AC10FGM
*** DIODES ***		
⚠D2002 D4E1 D462 D463 D5H1 D5H2 D5H3 ⚠D5P3 D571 D58A D581 D591 D6A8 D6F1 D623 D624 D625 D626 D627 D628 D635 D636 D651 D661 D662 D663 D7N1	360K1027	DIODE 1SS132

SYMBOL	PARTS NO	DESCRIPTION
D701B D701G D701R D702B D702G D702R D703B D703G D703R D704B D704G D704R D711 D712 D713 D714 D771 D772 D773 D781 D784 D821 D85A D851 D984	360K1027	DIODE 1SS132
D471 D721B D721G D721R D722B D722G D722R D741B D741G D741R D762 D782 D783	360K1032	DIODE 1SS82-TA
D461 D6A9	360K1033	DIODE 1SS131,AT52
ZD602 ZD625	360K3098	DIODE RD12EB(3)-T4
ZD624	360K3117	DIODE RD39EB(4)-T4
ZD761	360K3170	DIODE RD6.2JSB(2)/JSAB(2)
ZD601	360K3186	DIODE RD22EB(1)-T4
ZD7E1B	360K3428	DIODE RD7.5JS AB3-T4
ZD623	360K3602	DIODE RD2.0ESB(1)-T4
ZD5A1	360K3605	DIODE RD2.2ES B1-T4
ZD5H1 ZD981	360K3626	DIODE RD4.3ESB(1)-T4
ZD5H2	360K3630	DIODE RD4.7ESB(1)-T4
ZD4A1 ZD821	360K3635	DIODE RD5.1ESB(2)-T4
ZD762	360K3636	DIODE RD5.1ESB(3)-T4
ZD661 ZD7A1 ZD7A2 ZD7A3 ZD7A4 ZD751 ZD752 ZD8A1 ZD8A2	360K3639	DIODE RD5.6ESB(2)-T4
ZD571 ZD801 ZD802	360K3642	DIODE RD6.2ES AB1-T4
ZD629	360K3643	DIODE RD6.2ES AB2-T4
ZD551	360K3647	DIODE RD6.8ESB(2)-T4
ZD6A1	360K3652	DIODE RD7.5ESB(3)-T4
ZD5A2 ZD5A3 ZD591	360K3658	DIODE RD9.1ESB(1)-T4
ZD721	360K3660	DIODE RD9.1ESB(3)-T4
ZD603	360K3663	DIODE RD10ESB(2)-T4
ZD4E2	360K3670	DIODE RD12ES AB1-T4
ZD662 ZD771	360K3671	DIODE RD12ES AB2-T4
⚠ZD2001	360K3694	DIODE RD22ES AB1-T4
ZD627	360K3697	DIODE RD22ESB
ZD4E1	360K3717	DIODE RD33ES AB4-T4

SYMBOL	PARTS NO	DESCRIPTION
D602	361K7174	DIODE RU1P V1
D608 D609	361K7523	DIODE ERA15-04V1
⚠D2001 D5C1 D5C2	361K7562	DIODE EGP10G G23
⚠D5G1		
D6A6 D603 D606	361K7570	DIODE DINL20
D607 D610 D629		
D6F2	361K7769	DI 1SS290 T-72
D6A2	36107320	DIODE FMG-G26S
D6A4 D6A7	36107352	DIODE RL2Z-LFC4
D6A5	36107526	DIODE,RM1,LF-B2
D6A3	36107729	DIODE YG901C2
⚠D5P2	36107758	DIODE ERD37-10E
⚠D5P1 D6A1	36107760	DIODE FMG-G2CS
D593	36107770	DIODE ERC90M-03(5A)
D551	36107771	DIODE FE5DL-6596
⚠D553 ⚠D554	36107774	DIODE RG2A2(LF-A1)
D552	36107775	DIODE RX3Z(LF014-102)
⚠D555	36108250	DIODE FMQ-G5FS
⚠MD5P1	36108254	DIODE ESAC39M-04D F77
LED101	36801021	LED SML19416W-LF38
LED601	36801397	LED SEL1915CAM-LF58(C,D)
⚠D601	36808230	DIODE RBV-1506
D401 D5A1 D761	369K2136	DIODE RGP10G,AT
⚠TH601	38112071	POSISTOR (PTH451A180M270A
⚠TH602	38112072	POSISTOR (PTH451ABG3R0Q14
⚠PC603	38200354	PHOTOCOUPLER PC123FY2
⚠PC601 ⚠PC602	38200355	PHOTOCOUPLER TLP721F

*** TRANSFORMERS ***

T551	45804025	TRANS,H.DRAIVE (W492)
T981	45950003	D.F.TRANS
⚠L583	46204004	COIL,CHOKE 4MH
L592	46206016	COIL,CHOKE 4MH
⚠T601	46318105	SWITCHING TRANS W480
⚠T602	46701002	TRANS,PULSE

SYMBOL	PARTS NO	DESCRIPTION
L6A6	610G0257	COIL,CHOKE 33UH
⚠FL602	61062204	LINE FILTER (HR-24-E392)
⚠FL603	61062209	LINE FILTER (HR-28-E702)
L6A1	61099096	FILTER CHOKE 68UH K 1R5
LC902	616K6028	NOISE FILTER 1H223X-TA
LC7A1 LC7A2 LC7A3	616K6942	NOISE FILTER FILMAC TU20M
LC7A4		
LC471 LC703 LC711	616K6946	NOISE FILTER TH28123MA
LC721 LC731 LC761		
LC762 LC763 LC764		
LC901		
LC702B LC702G LC702R	616K6964	NOISE FILTER TX07250NBT
LC701B LC701G LC701R	616K6965	NOISE FILTER TX09500NBT
LC713		
LC741	616K6966	NOISE FILTER

*** PWB ASSYS ***

	84R69A01	SW MAIN PWB ASSY
	84R70C01	VIDEO PWB ASSY
	84R70D01	DEF PWB ASSY

*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***

HD555	31709503	SHEET,INSULATOR
HQ554	31709507	SHEET,INSULATOR HEAT SINK
SG901B SG901G SG901R	329J0214	ARRESTER(200V),AT52
SG902		
	32990205	INSUIATING CAP TIC-3.5(
	32990234	BNC/D-SUB PANEL
X801	64098039	X'TAL(10.000MHZ)
⚠F601	66699064	FUSE UL(ET) 250V 4A
SG903 ⚠SG951	667K6007	SPARK GAP 1.5KV
CN-CRT	70032058	CRT SOCKET(HPS0440)
IN601	70521064	AC RECEPTACLE
CORD	70800081	POWER CORD 3P E 8011
CABLE	73893226	SIGNAL CABLE D15P-MD15P K
⚠ICD5P1	79644121	HV CONTROL UNIT
⚠IC2001	79644181	HV PROTECTOR

SYMBOL	PARTS NO	DESCRIPTION
⚠T5R1	47105709	FBT
⚠T561	47710020	TRANS,H.OUTPUT(W422)

*** VARIABLE RESISTORS ***

VR582	410G1407	R,VARIABLE B1K
VR7E1	410G1412	R,VARIABLE B6.8K-T
VR401	410G1415	R,VARIABLE B22K-T
⚠VR5R1	415K5163	R,VARIABLE B200K
VR6A1	41505153	R,VARIABLE B500

*** RELAYS & SWITCHES ***

SW582	65161081	SWITCH SLIDE 00220867
⚠SW601	65360060	PUSH SWITCH ESB91631AXL
SW108	65360067	PUSH SWITCH ESB30
SW101 SW102 SW103	65361012	PUSH SWITCH
SW104 SW105 SW106		
SW107		
⚠RL581	65660045	RELAY DSBT2-M-2D-DC12V
RL851	65660046	RELAY OSA-SS-212DM5
⚠RL601 ⚠RL602	65690001	RELAY G5P-1

*** COILS & FILTERS ***

LC791 LC791B LC791G	390J9027	FILTER ZJSC-R12-100TA
LC791R		
MRC801 MRC802	39040002	RC,NETWORK 10K 1K 0.01UF
MRC803	39040003	RC,NETWORK 1K 0.01UF
MRC581	39099069	ARCL11S101J104Z
⚠L581	60919175	COIL,H.LIN 20T
L791	610E1711	COIL,FILTER 3.3UH
L602	610E1722	COIL,FILTER 27UH
L701B L701G L701R	610E1726	COIL,FILTER 56UH
L591 L593 L761	610F3025	COIL,FILTER 47UH
⚠L584	610F3041	COIL,FILTER 1000UH
L6A7 L6A8 L6A9	610F5002	FERRITE BEADS (B-02-RT)
L6E1		
L901B L901G L901R	610F6503	COIL,FILTER 0.15UH
L601 L604	610G0111	INDUCTOR,BEADS(FBR07HA121
⚠L5P1	610G0233	FILTER CHOKE PJ8T-470K
⚠L5P2	610G0242	FILTER CHOKE PJ8T-100M
L6A2 L6A3 L6A5	610G0257	COIL,CHOKE 33UH

SYMBOL	PARTS NO	DESCRIPTION

*** APPEARANCE PARTS ***

	25320061	CABINET BACK
	25320211	CABINET FRONT ASSY(AG)
	25319641	CABINET BACK
	25427941	REVOLVING STAND ASSY
	25546391	CHASSIS BASE
	25757643	LABEL(REV.)
	25785081	NAME PLATE,INSTRUCTION
	25852641	SCREW,SPECIAL(5*25)

*** PRINTED & PACKING MATERIALS ***

	24813191	BAG,POLYETHYLENE(150*370)
	25833111	CARTON BOX(CN510B)
	25833481	FILLER(T),CARTON
	25833491	FILLER(B),CARTON
	25833831	SHEET PROTECTION
	25846051	PLATE,PULL OUT(CN510)
	78131631	P1150(B) USER'S MANUAL

*** RESISTORS ***

J35 J62 J63	40AAD100	R,CHIP 0.0H 5% 1/2W
R443	40AAD124	R,CHIP 9.1H 5% 1/2W
R904	40AAD133	R,CHIP 22H 5% 1/2W
R425	40AAD141	R,CHIP 47H 5% 1/2W
R716B R716G R716R	40AAD161	R,CHIP 330H 5% 1/2W
R724	40AAD163	R,CHIP 390H 5% 1/2W
R709B R709G R709R	40AAD169	R,CHIP 680H 5% 1/2W
R50M	40AAD181	R,CHIP 2.2K 5% 1/2W
R784	40AAD221	R,CHIP 100K 5% 1/2W
J005 J006 J007	40AA1000	R,CHIP 0H 5% 1/8W
J10 J11 J14		
J15 J16 J17		
J18 J19 J20		
J21 J22 J23		
J25 J27 J28		
J29 J3 J30		
J31 J32 J4		
J5 J51 J52		
J53 J54 J55		

SYMBOL			PARTS NO	DESCRIPTION
J56	J57	J58	40AA1000	R,CHIP 0H 5% 1/8W
J59	J6	J60		
J61	J64	J65		
J66	J67	J68		
J69	J70	J71		
J72	J73	J74		
J81				
R58P			40AA1165	R,CHIP 470H 5% 1/8W
R527			40AA1173	R,CHIP 1.0K 5% 1/8W
R58R			40AA1209	R,CHIP 33K 5% 1/8W
R529			40AA1215	R,CHIP 56K 5% 1/8W
R430	R445	R8H8	40AA2005	R,CHIP 2.2H 5% 1/4W
R8J6				
R672	R674		40AA2149	R,CHIP 100H 5% 1/4W
R648			40AA2151	R,CHIP 120H 5% 1/4W
R7E2A	R714B	R714G	40AA2161	R,CHIP 330H 5% 1/4W
R714R				
R7E3A			40AA2167	R,CHIP 470H 5% 1/4W
R70EB	R70EG	R70ER	40AA2169	R,CHIP 680H 5% 1/4W
R706B	R706G	R706R		
R769	R772	R773	40AA2173	R,CHIP 1.0K 5% 1/4W
R744B	R744G	R744R	40AA2209	R,CHIP 33K 5% 1/4W
R743B	R743G	R743R	40AA2219	R,CHIP 82K 5% 1/4W
R742B	R742G	R742R	40AA2227	R,CHIP 180K 5% 1/4W
R741B	R741G	R741R	40AA2229	R,CHIP 220K 5% 1/4W
R746			40AA2233	R,CHIP 330K 5% 1/4W
R7G3	R7G8	R70G	40AA3000	R,CHIP 0.0H 5% 1/10W
R70K	R70L	R70M		
R703B	R703G	R703R		
R704B	R704G	R704R		
R732	R733	R75K		
R75L	R75P	R75R		
R75T	R793	R794		
R795	R966			
R431	R446		40AA3109	R,CHIP 2.2H 5% 1/10W
R58N	R638	R8J2	40AA3125	R,CHIP 10H 5% 1/10W
R8H4			40AA3129	R,CHIP 15H 5% 1/10W
R70FB	R70FG	R70FR	40AA3133	R,CHIP 22H 5% 1/10W
R646	R647		40AA3135	R,CHIP 27H 5% 1/10W
R639	R722B	R722G	40AA3137	R,CHIP 33H 5% 1/10W
R722R				

SYMBOL			PARTS NO	DESCRIPTION
R50H			40AA3141	R,CHIP 47H 5% 1/10W
R7K2	R7K4		40AA3143	R,CHIP 56H 5% 1/10W
R70AB	R70AG	R70AR	40AA3145	R,CHIP 68H 5% 1/10W
R8A3	R8A4		40AA3146	R,CHIP 75H 5% 1/10W
R512	R628	R635	40AA3149	R,CHIP 100H 5% 1/10W
R7A5	R7A6	R7A7		
R7A8	R705B	R705G		
R705R	R725B	R725G		
R725R				
R708B	R708G	R708R	40AA3151	R,CHIP 120H 5% 1/10W
R715B	R715G	R715R		
R717B	R717G	R717R		
R518			40AA3153	R,CHIP 150H 5% 1/10W
R7F1			40AA3159	R,CHIP 270H 5% 1/10W
R6F3	R7H1	R7H2	40AA3161	R,CHIP 330H 5% 1/10W
R7H3	R7H4			
R6F1			40AA3163	R,CHIP 390H 5% 1/10W
R522	R526	R671	40AA3167	R,CHIP 560H 5% 1/10W
R7G7			40AA3169	R,CHIP 680H 5% 1/10W
R426	R5K1	R5K2	40AA3173	R,CHIP 1.0K 5% 1/10W
R5K3	R5L1	R501		
R502	R503	R504		
R505	R506	R508		
R509	R511	R515		
R521	R528	R531		
R532	R6G2	R645		
R666	R7E4	R7F7		
R7F8	R7F9	R7N1		
R71E	R71G	R71H		
R71LB	R71LG	R71LR		
R731	R745B	R745G		
R745R	R75A	R75E		
R75F	R75G	R75H		
R754	R756	R757		
R758	R759	R799		
R961	R974	R981		
R525	R7E2E	R7K1	40AA3175	R,CHIP 1.2K 5% 1/10W
R7K3				
R71F			40AA3177	R,CHIP 1.5K 5% 1/10W
R641	R901B	R901G	40AA3179	R,CHIP 1.8K 5% 1/10W
R901R				
R637	R643	R669	40AA3181	R,CHIP 2.2K 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R7E6	R7F6	R7G6	40AA3181	R,CHIP 2.2K 5% 1/10W
R7N2	R7N5	R71K		
R797				
R665	R7E2B		40AA3183	R,CHIP 2.7K 5% 1/10W
R520	R6G3	R7H5	40AA3185	R,CHIP 3.3K 5% 1/10W
R7H6	R7H7	R7H8		
R85H	R85K	R85L		
R85M	R85N	R85P		
R796			40AA3187	R,CHIP 3.9K 5% 1/10W
R5L6	R50L	R6F2	40AA3189	R,CHIP 4.7K 5% 1/10W
R6F6	R7N6	R70N		
R75N				
R785			40AA3191	R,CHIP 5.6K 5% 1/10W
R753			40AA3193	R,CHIP 6.8K 5% 1/10W
R6G4			40AA3195	R,CHIP 8.2K 5% 1/10W
R5K0	R5K8	R5K9	40AA3197	R,CHIP 10K 5% 1/10W
R5L3	R5L4	R50G		
R50J	R534	R6F8		
R622	R623	R624		
R627	R629	R630		
R633	R634	R642		
R644	R649	R661		
R663	R664	R667		
R668	R7E3	R7E5		
R7F2	R7G1	R7G2		
R7N7	R70H	R707B		
R707G	R707R	R75M		
R752	R771	R774		
R775	R781	R782		
R783	R788	R79A		
R798	R8A5	R8A6		
R8A7	R8A9	R964		
R982				
R405	R625		40AA3201	R,CHIP 15K 5% 1/10W
R5L7			40AA3204	R,CHIP 20K 5% 1/10W
R6F7	R7E1	R7N8	40AA3205	R,CHIP 22K 5% 1/10W
R50K	R8A2		40AA3207	R,CHIP 27K 5% 1/10W
R523	R6F9	R650	40AA3209	R,CHIP 33K 5% 1/10W
R7A9				
R626			40AA3211	R,CHIP 39K 5% 1/10W
R7N3	R7N4	R79E	40AA3213	R,CHIP 47K 5% 1/10W
R8A1	R8A8			

SYMBOL			PARTS NO	DESCRIPTION
R632			40AA3215	R,CHIP 56K 5% 1/10W
R620			40AA3217	R,CHIP 68K 5% 1/10W
R621	R631		40AA3223	R,CHIP 120K 5% 1/10W
R6F4			40AA3229	R,CHIP 220K 5% 1/10W
R7A1	R7A2	R7A3	40AA3233	R,CHIP 330K 5% 1/10W
R7A4				
R786	R787		40AA3242	R,CHIP 750K 5% 1/10W
R636	R662		40AA3245	R,CHIP 1.0M 5% 1/10W
R50E			40AB1179	R,CHIP 1.8K 1% 1/8W
R427			40AB2128	R,CHIP 13H 1% 1/4W
R701B	R701G	R701R	40AB2146	R,CHIP 75H 1% 1/4W
R702B	R702G	R702R		
R475			40AB2187	C,CER,CHIP 3.9K 1% 1/4W
R8J5			40AB3126	R,CHIP 11H 1% 1/10W
R8H7			40AB3131	R,CHIP 18H 1% 1/10W
R712			40AB3145	R,CHIP 68H 1% 1/10W
R514			40AB3149	R,CHIP 100H 1% 1/10W
R718			40AB3155	R,CHIP 180H 1% 1/10W
R71A			40AB3161	R,CHIP 330H 1% 1/10W
R510			40AB3166	R,CHIP 510H 1% 1/10W
R50A			40AB3167	R,CHIP 560H 1% 1/10W
R984			40AB3171	R,CHIP 820H 1% 1/10W
R51G	R517		40AB3175	R,CHIP 1.2K 1% 1/10W
R52A			40AB3177	R,CHIP 1.5K 1% 1/10W
R422	R52E	R713	40AB3179	R,CHIP 1.8K 1% 1/10W
R516	R76A	R76F	40AB3180	R,CHIP 2.0K 1% 1/10W
R6F5	R792		40AB3182	R,CHIP 2.4K 1% 1/10W
R7G4	R719		40AB3183	R,CHIP 2.7K 1% 1/10W
R5L2			40AB3189	R,CHIP 4.7K 1% 1/10W
R7G5			40AB3191	R,CHIP 5.6K 1% 1/10W
R76E			40AB3192	R,CHIP 6.2K 1% 1/10W
R640	R969		40AB3193	R,CHIP 6.8K 1% 1/10W
R51H			40AB3194	R,CHIP 7.5K 1% 1/10W
R51A	R7F5		40AB3195	R,CHIP 8.2K 1% 1/10W
R519			40AB3196	R,CHIP 9.1K 1% 1/10W
R401	R403	R5K5	40AB3197	R,CHIP 10K 1% 1/10W
R51F				
R421	R95A	R951	40AB3198	R,CHIP 11K 1% 1/10W
R963				
R7F4			40AB3199	R,CHIP 12K 1% 1/10W

SYMBOL	PARTS NO	DESCRIPTION
R5K6 R51K R7F3	40AB3200	R,CHIP 13K 1% 1/10W
R5K7	40AB3201	R,CHIP 15K 1% 1/10W
R513	40AB3203	R,CHIP 18K 1% 1/10W
R424 R442 R8H6 R8J4	40AB3204	R,CHIP 20K 1% 1/10W
R7K5	40AB3205	R,CHIP 22K 1% 1/10W
R5L8	40AB3206	R,CHIP 24K 1% 1/10W
R51E	40AB3208	R,CHIP 30K 1% 1/10W
R5K4 R952 R953 R954 R955	40AB3209	R,CHIP 33K 1% 1/10W
R670	40AB3211	R,CHIP 39K 1% 1/10W
R402 R404	40AB3212	R,CHIP 43K 1% 1/10W
R962	40AB3213	R,CHIP 47K 1% 1/10W
R423 R441 R8H3 R8J1	40AB3214	R,CHIP 51K 1% 1/10W
R471	40AB3215	R,CHIP 56K 1% 1/10W
R472	40AB3218	R,CHIP 75K 1% 1/10W
R473 R474	40AB3225	R,CHIP 150K 1% 1/10W
R58L	40AC3129	R,CHIP 15H 5% 1W
R58M	40AC3131	R,CHIP 18H 5% 1W
R6G1	40AD4231	R,CHIP 270K 0.5% 1/10W
R6G0	40AD4247	R,CHIP 1.2M 0.5% 1/10W
R411	401CF601	R,CARBON 1.0H 5% 1/4W
R903	401CF649	R,CARBON 100H 5% 1/4W
R993	401CF693	R,CARBON 6.8K 5% 1/4W
R765	401CF699	R,CARBON 12K 5% 1/4W
R612 R615	401CF729	R,CARBON 220K 5% 1/4W
R682	401CF731	R,CARBON 270K 5% 1/4W
R684	401CF733	R,CARBON 330K 5% 1/4W
R85G	401CF755	R,CARBON 2.7M 5% 1/4W
R411	401C6601	R,CARBON 1.0H 5% 1/4W
⚠R5P4 ⚠R5P5	401C6633	R,CARBON 22H 5% 1/4W
R591	401C6641	R,CARBON 47H 5% 1/4W
R850	401C6643	R,CARBON 56H 5% 1/4W
R903	401C6649	R,CARBON 100H 5% 1/4W
R6A7	401C6657	R,CARBON 220H 5% 1/4W
R466 R905	401C6689	R,CARBON 4.7K 5% 1/4W
R993	401C6693	R,CARBON 6.8K 5% 1/4W
R617	401C6697	R,CARBON 10K 5% 1/4W
R765	401C6699	R,CARBON 12K 5% 1/4W

SYMBOL	PARTS NO	DESCRIPTION
R5H7	401K5685	R,CARBON 3.3K 5% 1/6W
R462 R5E1 R5E3 R6E8	401K5689	R,CARBON 4.7K 5% 1/6W
R5A7	401K5691	R,CARBON 5.6K 5% 1/6W
R4A9 R4C1 R467 R5H2 R592	401K5695	R,CARBON 8.2K 5% 1/6W
⚠R2003 R4E1 R4E3 R5A3 R5B2 R5B3 R5H4 R5H5 R5H6 R611 R683 R808 R809 R831 R832 R841 R846 ⚠R85A R851 R857	401K5697	R,CARBON 10K 5% 1/6W
R5A4	401K5699	R,CARBON 12K 5% 1/6W
⚠R2005 R6E2	401K5705	R,CARBON 22K 5% 1/6W
⚠R2004	401K5707	R,CARBON 27K 5% 1/6W
R5A9 R5B5 R828	401K5713	R,CARBON 47K 5% 1/6W
R761	401K5717	R,CARBON 68K 5% 1/6W
R70NA ⚠R85C	401K5719	R,CARBON 82K 5% 1/6W
⚠R2002 R5A2 R6H1 R608 R766 R85E R85F	401K5721	R,CARBON 100K 5% 1/6W
R990	401K5733	R,CARBON 330K 5% 1/6W
⚠R5F3	401K5735	R,CARBON 390K 5% 1/6W
R5H3	401K5737	R,CARBON 470K 5% 1/6W
R58A R58C R584 R586 R588 R589	401K5739	R,CARBON 560K 5% 1/6W
R5A6	401K5745	R,CARBON 1.0M 5% 1/6W
R618	40216282	R,WIRE 10W 1.0H
⚠R602	40299144	R,WIRE 15H 5% 7W
R410	403F1101	R,METAL OXIDE 1H 5% 1W
R555	403F1149	R,METAL OXIDE 100H 5% 1W
R8J3	403F2147	R,METAL OXIDE 82H 5% 2W
R8H5	403F2151	R,METAL OXIDE 120H 5% 2W
R991	403F2215	R,METAL OXIDE 56K 5% 2W
R563	40371125	R,METAL 10H 5% 1W
R6E1	40371131	R,METAL 18H 5% 1W
R553	40371133	R,METAL 22H 5% 1W
R6A2	40371135	R,METAL 27H 5% 1W
R575	40371187	R,METAL 3.9K 5% 1W

SYMBOL	PARTS NO	DESCRIPTION
R5B1 R5B4	401C6727	R,CARBON 180K 5% 1/4W
R612 R615	401C6729	R,CARBON 220K 5% 1/4W
R682	401C6731	R,CARBON 270K 5% 1/4W
R684	401C6733	R,CARBON 330K 5% 1/4W
R680 R685	401C6745	R,CARBON 1.0M 5% 1/4W
R85G	401C6755	R,CARBON 2.7M 5% 1/4W
⚠R985 ⚠R986	401G6141	R,CARBON 47H 5% 1/4W
R762	401G6189	R,CARBON 4.7K 5% 1/4W
⚠R5F2	401G6191	R,CARBON 5.6K 5% 1/4W
R564	401H5617	R,CARBON 4.7H 5% 1/2W
R902B R902G R902R	401H5633	R,CARBON 22H 5% 1/2W
R673	401H5647	R,CARBON 82H 5% 1/2W
R4A1	401H5663	R,CARBON 390H 5% 1/2W
R409	401H5675	R,CARBON 1.2K 5% 1/2W
⚠R995	401H5677	R,CARBON 1.5K 5% 1/2W
R461	401H5689	R,CARBON 4.7K 5% 1/2W
R859	401H5723	R,CARBON 120K 5% 1/2W
R601	401H5737	R,CARBON 470K 5% 1/2W
R711B R711G R711R	401JJ820	R,CARBON 0.0H
R711B R711G R711R R806 R987	401J9820	R,CARBON 0.0H
R593	401K5609	R,CARBON 2.2H 5% 1/6W
R989	401K5617	R,CARBON 4.7H 5% 1/6W
R552 R6E3	401K5625	R,CARBON 10H 5% 1/6W
R551 R58D	401K5649	R,CARBON 100H 5% 1/6W
R821	401K5653	R,CARBON 150H 5% 1/6W
R107	401K5655	R,CARBON 180H 5% 1/6W
R801 R802	401K5663	R,CARBON 390H 5% 1/6W
R468 R469	401K5665	R,CARBON 470H 5% 1/6W
R108 R109 R481 R482 R484 R5E2 R576 R577 R80A R807 R833 R844 R847	401K5673	R,CARBON 1.0K 5% 1/6W
R848	401K5675	R,CARBON 1.2K 5% 1/6W
R558	401K5677	R,CARBON 1.5K 5% 1/6W
R408 R463 R483 R5C9 R574 R852	401K5679	R,CARBON 1.8K 5% 1/6W
R5H1 R616	401K5681	R,CARBON 2.2K 5% 1/6W
R803 R804	401K5683	R,CARBON 2.7K 5% 1/6W

SYMBOL	PARTS NO	DESCRIPTION
R476	40371211	R,METAL 39K 5% 1W
⚠R5P3	40371331	R,METAL 0.27 5% 1W
⚠R5F1	40371343	R,METAL 0.82H 5% 1W
R860	40372111	R,METAL 2.7H 5% 2W
R7E1A	40372119	R,METAL 5.6H 5% 2W
R829	40372121	R,METAL 6.8H 5% 2W
R7E1B	40372129	R,METAL 15H 5% 2W
⚠R583	40372131	R,METAL 18H 5% 2W
R610	40372143	R,METAL 56H 5% 2W
R464	40372169	R,METAL 680H 5% 2W
R6A3 R6A4 R6E9	40372199	R,METAL 12K 5% 2W
R605 R606	40372213	R,METAL 47K 5% 2W
R6A6 R6A9	40372221	R,METAL 100K 5% 2W
R609	40373159	R,METAL 270H 5% 3W
R603 R604	40373211	R,METAL 39K 5% 3W
R607	40373333	R,METAL 0.33H 5% 3W
⚠R5P1 ⚠R5P2	40376151	R,METAL120H 5% 3W
R444	40378143	R,METAL 56H 5% 2W
⚠R581	40383028	R,METAL 180H 5% 3W
R554	40399092	R,METAL 1.2H 5% 5W
R110 R111	404CA670	R,METAL 750H 1% 1/6W
R407	404CA682	R,METAL 2.4K 1% 1/5W
R406	404CA696	R,METAL 9.1K 1% 1/6W
R767	404CA726	R,METAL 160K 1% 1/6W
R614	404CA741	R,METAL 680K 1% 1/6W
R613	404CA743	R,METAL 820K 1% 1/6W
R992	404C1669	R,METAL 680H 1% 1/6W
R110 R111	404C1670	R,METAL 750H 1% 1/6W
R407	404C1682	R,METAL 2.4K 1% 1/6W
R5A1	404C1683	R,METAL 2.7K 1% 1/6W
R6E7	404C1684	R,METAL 3.0K 1% 1/6W
R6E5 R6E6	404C1691	R,METAL 5.6K 1% 1/6W
R406	404C1696	R,METAL 9.1K 1% 1/6W
R4A3 R4A6 R4A7 R5C2 R556	404C1697	R,METAL 10K 1% 1/6W
R5C4	404C1699	R,METAL 12K 1% 1/6W
R5A8	404C1700	R,METAL 13K 1% 1/6W
⚠R5R1 R768	404C1701	R,METAL 15K 1% 1/6W
R5A5 R560	404C1702	R,METAL 16K 1% 1/6W
R5C3	404C1703	R,METAL 18K 1% 1/6W

SYMBOL	PARTS NO	DESCRIPTION
R5C6	404C1705	R,METAL 22K 1% 1/6W
R5C8	404C1707	R,METAL 27K 1% 1/6W
R561	404C1708	R,METAL 30K 1% 1/6W
R4A8	404C1711	R,METAL 39K 1% 1/6W
R5C5 R681	404C1715	R,METAL 56K 1% 1/6W
⚠R5R2 R5R6 R686	404C1717	R,METAL 68K 1% 1/6W
R4A5 R6E4 R763	404C1719	R,METAL 82K 1% 1/6W
R5C7 ⚠R5R3	404C1721	R,METAL 100K 1% 1/6W
R4A4 R5C1 R764	404C1723	R,METAL 120K 1% 1/6W
R767	404C1726	R,METAL 160K 1% 1/6W
⚠R5R5	404C1729	R,METAL 220K 1% 1/6W
R614	404C1741	R,METAL 680K 1% 1/6W
R613	404C1743	R,METAL 820K 1% 1/6W
R751	404J9443	R,METAL 1.3K 0.5% 1/8W
⚠R2001 ⚠R562 ⚠R572	404K5109	R,METAL 2.2H 5% 1/4W
⚠R4F1 R465 ⚠R5G1	404K5125	R,METAL 10H 5% 1/4W
⚠R994		
⚠R5H8	404K5135	R,METAL 27H 5% 1/4W
R619	40405125	R,METAL 10H 5% 1/4W
R983	40499449	R,METAL 10K 2% 1W
R6H2 R6H3 R6H4	40499507	R,METAL 0.22H 5% 1/2W
R594	408A8107	R,FUSE 1.8H 5% 1/2W
⚠R6A8	4081J907	R,FUSE 1.0H 5% 2W

*** CAPACITORS ***

C402 C6F2	42AA1509	C,CHIP CERAMIC 50V 1000PF
C629 C7N2	42AA1515	C,CHIP CERAMIC 50V 3300PF
C409	42AA1516	C,CHIP CERAMIC 50V 3900PF
C631 C792	42AA1517	C,CHIP CERAMIC 50V 4700PF
C5L3	42AA1520	C,CHIP CERAMIC 50V 8200PF
C623 C625 C635	42AA1521	C,CHIP CERAMIC 50V 0.01UF
C630 C632	42AA1523	C,CHIP CERAMIC 50V0.015UF
C751	42AA1527	C,CERAMIC 25V 0.01UF
C791	42AA1538	C,CERAMIC 25V 0.1UF
C624 C626 C628	42AA2721	C,CERAMIC 50V 0.1UF
C633 C636 C661		
C662 C663 C773		
C421 C422 C471	42AA2726	C,CERAMIC 50V 0.01UF
C7F4 C702B C702G		

SYMBOL	PARTS NO	DESCRIPTION
C85E C85F C85G	42CA1456	C,CERAMIC 50V 470PF
C854 C855 C856		
⚠C581	420C9066	C,CERAMIC 500V 1800PF
C902	420C9551	C,CERAMIC 500V 100PF
C901	420C9557	C,CERAMIC 500V 330PF
C5A6	420C9561	C,CERAMIC 500V 680PF
C5A7	420C9562	C,CERAMIC 500V 820PF
C5A5 C742B C742G	420C9563	C,CERAMIC 500V 1000PF
C742R C761 C985		
C988		
C5A2	420C9565	C,CERAMIC 500V 1500PF
C554	420C9567	C,CERAMIC 500V 2200PF
C552	420C9571	C,CERAMIC 500V 4700PF
C616	420DA014	C,CERAMIC 2KV 150PF
C904	420D0019	C,CERAMIC 2KV 1000PF
⚠C602 ⚠C603 ⚠C605	420EC067	C,CERAMIC 250V 2200PF
⚠C606		
⚠C607 ⚠C608	420EC071	C,CERAMIC 400V 4700PF
C6A5 C611	420JJ088	C,CERAMIC 2K 220PF
C726	420J9118	C,CERAMIC 500V 0.01UF
C903	42040108	C,CERAMIC 2KV 0.01UF
C4A2 C5H2 C808	421A0425	C,CERAMIC 50V 0.01UF
C964		
C5H5 C510	421C0211	C,CERAMIC 50V 680PF
C85C	421C0212	C,CERAMIC 50V 820PF
C80A	421C0213	C,CERAMIC 50V 1000PF
C2004 C4C2 C4C4	421D6009	C,CERAMIC 25V 0.1UF
C403 C405 C5C3		
C5C6 C5C8 C5H3		
C5H4 ⚠C5P6 C58K		
C6F8 C801 C803		
C852 C972		
C5A3	423A1101	C,CERAMIC 50V 470PF
C817 C818	423A2015	C,CERAMIC 50V 10PF
C804 C805	423A2037	C,CERAMIC 50V 47PF
C573 C958 C961	423A2045	C,CERAMIC 50V 100PF
C966		
C462	423A2104	C,CERAMIC 50V 220PF
C989	423E2111	C,CERAMIC 500V 10PF
C5H1 C6F6	427F4601	C,FILM 50V 1000PF

SYMBOL	PARTS NO	DESCRIPTION
C702R C704B C704G	42AA2726	C,CERAMIC 50V 0.01UF
C704R C712B C712G		
C712R C719 C8H4		
C8H5 C957 C975		
C982		
C423 C430 C442	42AA2744	C,CERAMIC 25V 0.1UF
C5K0 C5K2 C5K7		
C5K9 C50A C50C		
C50E C50F C50G		
C50P C50Q C501		
C502 C503 C504		
C505 C508 C509		
C513 C516 C521		
C523 C524 C526		
C527 C531 C532		
C7E1 C7E2 C7F5		
C7H1 C7H2 C7H3		
C7H5 C70A C70E		
C70KB C70KG C70KR		
C70PB C70PG C70PR		
C707B C707G C707R		
C708B C708G C708R		
C71A C71EB C71EG		
C71ER C714B C714G		
C714R C715B C715G		
C715R C717B C717G		
C717R C721B C721G		
C721R C732 C743B		
C743G C743R C744B		
C744G C744R C753		
C754 C756 C757		
C758 C759 C76A		
C766 C767 C79G		
C798 C8A2 C8H3		
C8J2 C950 C953		
C954 C965 C971		
C973		
C728B C728G C728R	42CA1416	C,CERAMIC 50V 10PF
C723B C723G C723R	42CA1428	C,CERAMIC 50V 33PF
C71G	42CA1432	C,CERAMIC 50V 47PF
C79F	42CA1438	C,CERAMIC 50V 82PF
C79K	42CA1444	C,CERAMIC 50V 150PF
C50J	42CA1452	C,CHIP 50V 330PF

SYMBOL	PARTS NO	DESCRIPTION
C5K4	427F4602	C,FILM 50V 1200PF
C7F2	427F4607	C,FILM 50V 3300PF
C514 C6F5	427F4609	C,FILM 50V 4700PF
C6A1	427F4617	C,FILM 50V 0.022UF
C467	427F4620	C,FILM 50V 0.039UF
⚠C5R2 C6F1 C614	427F4625	C,FILM 50V 0.1UF
C7A9		
C7A6 C7A7 C7F1	427F4629	C,FILM 50V 0.22UF
C520	427F4651	C,FILM 50V 1000PF
C5K5	427F4693	CQ93M1H471J,BT
⚠C5P4	42703458	C,FILM 630V 3900PF
C7A1 C7A3 C771	428B3013	C,METAL FILM 50V 0.1UF
C5A4	428B3017	C,METAL FILM 50V 0.22UF
C4A3 C5C1	428B3021	C,METAL FILM 50V 0.47UF
C5K3 C5L2	428B3617	C,METAL 50V 0.22UF
C506	428B3619	C,METAL 50V 0.33UF
C5C2	428C9001	C,METAL FILM 100V 0.068UF
C461	428C9022	C,METAL FILM 250V 0.1UF
⚠C5P2	428DE025	C,METAL 100V 1.0UF
C472	428D0081	C,METAL 250V 0.01UF
C465 C724B C724G	428D0097	C,FILM 250V 0.22UF
C724R		
C610	428D0165	C,FILM 400V 0.022UF
C408	428D4317	C,METAL FILM 100V 0.22UF
C591	428D5093	C,METAL 250V 0.1UF
⚠C5P3	42808501	C,METAL FILM 1.6KV 1000PF
⚠C584 ⚠C585	42816354	C,FILM 250V 0.18UF 5%
⚠C586	42816358	C,FILM 250V 0.33UF 5%
⚠C58A	42816360	C,FILM 250V 0.39UF 5%
⚠C589	42816361	C,FILM 250V 0.47UF 5%
⚠C588	42816362	C,FILM 250V 0.56UF 5%
⚠C583	42816378	C,FILM 250V 0.16UF 5%
⚠C587	42816384	C,FILM 250V 0.62UF 5%
⚠C601	42824861	C,FILM 250V 0.47UF
C615	42840241	C,METAL 630V 0.47
C595 C597	42898004	C,METAL 250V 1.5UF
⚠C604 ⚠C613	42899098	C,FILM 250V 0.1UF
⚠C553	42899175	C,METAL 2.0KV 5600P
C7F6	430B6016	C,ELEC 10V 100UF
C7N4 C70T	430B6028	C,ELEC 16V 47UF

SYMBOL			PARTS NO	DESCRIPTION
C70LB	C70LG	C70LR	430B6029	C,ELEC 16V 100UF
C76F				
C781			430B6030	C,ELEC 16V 220UF
C802			430B6032	C,ELEC 16V 470UF
C7E1A			430B6039	C,ELEC 25V 22UF
C464	C464A	C533	430B6041	C,ELEC 25V 47UF
C5C7	C7A8	C7F8	430B6061	C,ELEC 50V 1.0UF
C4A5	C466	C7N3	430B6065	C,ELEC 50V 10UF
C70GB	C70GG	C70GR		
C70HB	C70HG	C70HR		
C70MB	C70MG	C70MR		
C986				
C4A1			430B6067	C,ELEC 50V 33UF
C76E			430B6099	C,ELEC 100V 22UF
C782			430B6553	C,ELEC 250V 2.2UF
C476	C70F	C705	430B8144	C,ELEC 16V 47UF
C706	C8A1			
C709			430B8145	C,ELEC 16V 100UF
C85H	C85K	C85L	430B8177	C,ELEC 50V 3.3UF
C857	C858	C859		
C7F7			430B8179	C,ELEC 50V 10UF
C2003	⚠C5F1	C6E8	430B9016	C,ELEC 10V 100UF
C58P	C76H	C79E	430B9017	C,ELEC 10V 220UF
C6E7			430B9020	C,ELEC 10V 1000UF
C772			430B9026	C,ELEC 16V 22UF
C713B	C713G	C713R	430B9028	C,ELEC 16V 47UF
C752	C765			
C525	C71F		430B9029	C,ELEC 16V 100UF
C722	C76G		430B9030	C,ELEC 16V 220UF
C6E3			430B9033	C,ELEC 16V 1000UF
C622			430B9038	C,ELEC 25V 10UF
C4C3	C425	C426	430B9041	C,ELEC 25V 47UF
⚠C5P5	C50B	C50D		
C612	C952	C955		
C76K	C851	C853	430B9042	C,ELEC 25V 100UF
C4C1	C627		430B9043	C,ELEC 25V 220UF
C6E2	C6E5		430B9045	C,ELEC 25V 470UF
C637	C793	C963	430B9061	C,ELEC 50V 1.0UF
C515	C519	C621	430B9062	C,ELEC 50V 2.2UF
C711B	C711G	C711R	430B9063	C,ELEC 50V 3.3UF

SYMBOL			PARTS NO	DESCRIPTION
⚠C5R1	C634	C824	430B9065	C,ELEC 50V 10UF
C825				
⚠C2001			430B9066	C,ELEC 50V 22UF
C664			430B9069	C,ELEC 50V 100UF
C407			430B9070	C,ELEC 50V 220UF
C404	C406		430B9071	C,ELEC 50V 330UF
C983			430B9085	C,ELEC 63V 47UF
⚠C987			430B9098	C,ELEC 100V 10 UF
C727	C984		430B9101	C,ELEC 100V 47UF
C741B	C741G	C741R	430B9512	C,ELEC 160V 1.0UF
C764			430B9514	C,ELEC 160V 3.3UF
⚠C5G1	C762		430B9516	C,ELEC 160V 10UF
C5A1			430B9554	C,ELEC 250V 3.3UF
C976			430C0136	C,ELEC 10V 47UF
C5K8	C507	C718B	430C0244	C,ELEC 16V 47UF
C718G	C718R			
C5K1			430C0245	C,ELEC 16V 100UF
C528			430C0261	C,ELEC 35V 4.7UF
C50K			430C0275	C,ELEC 50V 1.0UF
C716B	C716G	C716R	430C0276	C,ELEC 50V 2.2UF
C956	C974		430C0278	C,ELEC 50V 4.7UF
C512			430C0279	C,ELEC 50V 10UF
C534			430C8522	C,ELEC 25V 330UF
C594			430JH107	C,ELEC 250V 4.7UF
C6E6			4302J046	C,ELEC 25V 1000UF
C6E1	C6E9		4302J047	C,ELEC 25V 2200UF
C6A8			4302J102	C,ELEC 100V 100UF
C6A7			4302J105	C,ELEC 100V 470UF
C6A4			4302J559	C,ELEC 250V 47UF
C6A3			4302J560	C,ELEC 250V 100UF
C745			43029518	C,ELEC 160V 33UF
C592			43029558	C,ELEC 250V 33UF
C551			43049048	C,ELEC 35V 1000UF
⚠C5P1			4309J196	C,ELEC 100V 120UF
C593			43099232	C,ELEC 250V 10UF
⚠C609			43113184	C,ELEC 400V 560UF M
C7H6B	C7H6G	C7H6R	433A4027	C,ELEC 16V 220UF
C70RB	C70RG	C70RR		
C981			433A4033	C,ELEC 25V 10UF
C7A2	C7A5		433A4056	C,ELEC 50V 2.2UF

SYMBOL			PARTS NO	DESCRIPTION
C701B	C701G	C701R	433A6147	C,ELEC 16V 47UF
C703B	C703G	C703R		
C7A4			433A6179	C,ELEC 50V 2.2UF
⚠C2002			433A7002	C,ELEC 10V 47UF
C522			433A7013	C,ELEC 16V 47UF
⚠C58M	C58R		433A7014	C,ELEC 16V 100UF
C4A6			433A7046	C,ELEC 50V 10UF

REPLACEMENT PARTS LIST

The components specified for Model JC-2145UMR

Note: The components identified by⚠ make are critical for safety.
Replace only with parts Number specified.

SYMBOL	PARTS NO	DESCRIPTION

*** CRT & TUNER ***

SYMBOL	PARTS NO	DESCRIPTION
⚠CRT	33021513	CRT M50LJG39X27R

*** ICS ***

SYMBOL	PARTS NO	DESCRIPTION
IC6F1	370A1009	IC UPC1093J-T (REG)
IC952	37005085	IC UPC78L12J
IC851	37005193	IC PQ12RF11 (REG)
IC503	37005221	IC UPC78M09AHF
IC803	37005277	IC PQ05RR13 (REG)
IC401	37006022	IC LA7846N
IC501	37009036	IC UPC1883ACT
IC751	37010007	IC M52324P
IC4A1	37010008	IC CA0007AD
IC420 IC8H1	37011003	IC LA6510
IC4C1 IC505	37011068	IC UPC4558C (OP AMP)
IC701	37011355	IC M52348SP
IC711	37011356	IC M52722SP
IC951	37011363	IC M52723SP
IC5L1	37051034	MOS UPD4040BC (COUNT)
IC5K2	37051179	IC SN74LS123N (MONO MLT)
IC6A1	37052032	IC SN74LS221N (MULTIVIB)
IC7E1	37052064	IC HD74LS08P
IC802	37055537	MOS NM24C04EN
IC5H2 IC661	37056615	IC BA10393
IC5C2 IC5H1 IC502 IC504	37056616	IC BA10358
IC703 IC753	37056812	IC M62362P
IC702	37056814	IC M52035P
IC5C1 IC761 IC771	37056926	IC BA10324A (Q OP-AMP)
IC621	37076081	IC UC3842N
IC531 IC532 IC731 IC752 IC961	37076176	MOS M62393P
IC791	37076298	MOS M35043-052SP
IC7A1	37076303	IC CXA2016S
IC5K1	37076324	MOS HD14046BP
IC8A1	37076328	MOS 24LCS21-I/P
IC721	37076337	IC VPS13
IC801	37076346	MOS UPD78014FYCW-W14

SYMBOL	PARTS NO	DESCRIPTION

*** TRANSISTORS ***

SYMBOL	PARTS NO	DESCRIPTION
Q983	350A2001	TR 2SA1038S-TP R
⚠Q5F1	350A2002	TR 2SA1038S-TP S
⚠Q857	350B9962	TR 2SB1328 P-T105
Q985	350B9972	TR 2SB1353 E-T114
Q602	350D7217	TR 2SC945-T Q
Q4E1	350E3217	TR 2SC1740S-T Q
⚠Q2002 Q462 Q464 Q465 Q481 Q5H3 Q5H5 Q551 Q571	350E3218	TR 2SC1740S-T R
Q762	350E8905	TR 2SC1841E-T
Q7E1A	350G1017	TR 2SD2005-T105 Q
Q984	350G2672	TR 2SD2033A E-T114
Q711B Q711G Q711R	350H0200	TR 2SC2407A-T
Q461	350H1811	TR,2SC2901 K-T
Q782	350H4418	TR,2SC1473-TA R
Q702B Q702G Q702R	350J4704	TR 2SC3777-AA D
Q603	350J4818	TR 2SC1473A-TA R
Q5A2 Q5A4 Q742B Q742G Q742R Q855	350J5205	TR 2SC3415S-TP
Q981 Q982	350J5241	TR 2SC2389S-TP R
Q858	350J5242	TR 2SC2389S-TP S
Q987	350J5262	TR 2SC4620 P-TV2
Q101 Q102	350K3517	TR 2SA733/2SA733A-T Q
Q471 Q763 Q764	350K4112	TR 2SA916-T L
Q852	350K4311	TR 2SA953-T K
Q741B Q741G Q741R	350K5218	TR,2SA1018-TA R
Q463 Q5H2 Q5H4 Q5H6 Q552	350K5718	TR 2SA933S-T R
Q555	35025211	TR 2SB546 K
Q761	35056311	TR 2SC2688 K
Q585	35072612	TR 2SD2396 J
⚠Q554	35095120	TR 2SC5047
Q5C1	351B7660	TR 2SK1484-T
⚠Q2001 ⚠Q2003	351G0556	TR DTA114WS-T
Q6A2	351G0557	TR DTA114YS-T
Q5H1 Q583 Q6A3 Q801 Q802 Q851	351G0601	TR DTC114ES-T
Q103 Q104	351G0641	TR DTC114YS-T
Q859	351G0654	TR DTC123JS TP

SYMBOL	PARTS NO	DESCRIPTION
Q6A1	35122600	TR 2SK701
Q5A1 Q5A3	35124500	TR 2SJ196
Q553	35127720	TR IRLI530G
Q591	35127790	TR 2SJ449
⚠Q5P1	35127900	TR 2SK2771-01R
MQ581	35127940	TR SLA5038
⚠Q601 ⚠Q604	35127950	TR 2SK2611
Q581	35128003	TR 2SK2098-01MR(F119)
⚠CR601	35595015	TRIAC AC10FGM

*** DIODES ***

SYMBOL	PARTS NO	DESCRIPTION
⚠D2002 D4E1 D462 D463 D5H1 D5H2 D5H3 ⚠D5P3 D571 D58A D581 D591 D6A8 D6F1 D623 D624 D625 D626 D627 D628 D635 D636 D651 D661 D662 D663 D7N1	360K1027	DIODE 1SS132

SYMBOL	PARTS NO	DESCRIPTION
D701B D701G D701R D702B D702G D702R D703B D703G D703R D704B D704G D704R D711 D712 D713 D714 D771 D772 D773 D781 D784 D821 D85A D851 D984	360K1027	DIODE 1SS132
D471 D721B D721G D721R D722B D722G D722R D741B D741G D741R D762 D782 D783	360K1032	DIODE 1SS82-TA
D461 D6A9	360K1033	DIODE 1SS131,AT52
ZD602 ZD625	360K3098	DIODE RD12EB(3)-T4
ZD624	360K3117	DIODE RD39EB(4)-T4
ZD761	360K3170	DIODE RD6.2JSB(2)/JSAB(2)
ZD601	360K3186	DIODE RD22EB(1)-T4
ZD7E1B	360K3428	DIODE RD7.5JS AB3-T4
ZD623	360K3602	DIODE RD2.0ESB(1)-T4
ZD5A1	360K3605	DIODE RD2.2ES B1-T4
ZD5H1 ZD981	360K3626	DIODE RD4.3ESB(1)-T4
ZD5H2	360K3630	DIODE RD4.7ESB(1)-T4
ZD4A1 ZD821	360K3635	DIODE RD5.1ESB(2)-T4
ZD762	360K3636	DIODE RD5.1ESB(3)-T4
ZD661 ZD7A1 ZD7A2 ZD7A3 ZD7A4 ZD751 ZD752 ZD8A1 ZD8A2	360K3639	DIODE RD5.6ESB(2)-T4
ZD571 ZD801 ZD802	360K3642	DIODE RD6.2ES AB1-T4
ZD629	360K3643	DIODE RD6.2ES AB2-T4
ZD551	360K3647	DIODE RD6.8ESB(2)-T4
ZD6A1	360K3652	DIODE RD7.5ESB(3)-T4
ZD5A2 ZD5A3 ZD591	360K3658	DIODE RD9.1ESB(1)-T4
ZD721	360K3660	DIODE RD9.1ESB(3)-T4
ZD603	360K3663	DIODE RD10ESB(2)-T4
ZD4E2	360K3670	DIODE RD12ES AB1-T4
ZD662 ZD771	360K3671	DIODE RD12ES AB2-T4
⚠ZD2001	360K3694	DIODE RD22ES AB1-T4
ZD627	360K3697	DIODE RD22ESB
ZD4E1	360K3717	DIODE RD33ES AB4-T4

SYMBOL	PARTS NO	DESCRIPTION
D602	361K7174	DIODE RU1P V1
D608 D609	361K7523	DIODE ERA15-04V1
⚠D2001 D5C1 D5C2 ⚠D5G1	361K7562	DIODE EGP10G G23
D6A6 D603 D606 D607 D610 D629	361K7570	DIODE DINL20
D6F2	361K7769	DI 1SS290 T-72
D6A2	36107320	DIODE FMG-G26S
D6A4 D6A7	36107352	DIODE RL2Z-LFC4
D6A5	36107526	DIODE,RM1,LF-B2
D6A3	36107729	DIODE YG901C2
⚠D5P2	36107758	DIODE ERD37-10E
⚠D5P1 D6A1	36107760	DIODE FMG-G2CS
D593	36107770	DIODE ERC90M-03(5A)
D551	36107771	DIODE FE5DL-6596
⚠D553 ⚠D554	36107774	DIODE RG2A2(LF-A1)
D552	36107775	DIODE RX3Z(LF014-102)
⚠D555	36108250	DIODE FMQ-G5FS
⚠MD5P1	36108254	DIODE ESAC39M-04D F77
LED101	36801021	LED SML19416W-LF38
LED601	36801397	LED SEL1915CAM-LF58(C,D)
⚠D601	36808230	DIODE RBV-1506
D401 D5A1 D761	369K2136	DIODE RGP10G,AT
⚠TH601	38112071	POSISTOR (PTH451A180M270A
⚠TH602	38112072	POSISTOR (PTH451ABG3R0Q14
⚠PC603	38200354	PHOTOCOUPLER PC123FY2
⚠PC601 ⚠PC602	38200355	PHOTOCOUPLER TLP721F
*** TRANSFORMERS ***		
T551	45804025	TRANS,H.DRAIVE (W492)
T981	45950003	D.F.TRANS
⚠L583	46204004	COIL,CHOKE 4MH
L592	46206016	COIL,CHOKE 4MH
⚠T601	46318105	SWITCHING TRANS W480
⚠T602	46701002	TRANS,PULSE

SYMBOL	PARTS NO	DESCRIPTION
L6A6	610G0257	COIL,CHOKE 33UH
⚠FL602	61062204	LINE FILTER (HR-24-E392)
⚠FL603	61062209	LINE FILTER (HR-28-E702)
L6A1	61099096	FILTER CHOKE 68UH K 1R5
LC902	616K6028	NOISE FILTER 1H223X-TA
LC7A1 LC7A2 LC7A3 LC7A4	616K6942	NOISE FILTER FILMAC TU20M
LC471 LC703 LC711 LC721 LC731 LC761 LC762 LC763 LC764 LC901	616K6946	NOISE FILTER TH28123MA
LC702B LC702G LC702R	616K6964	NOISE FILTER TX07250NBT
LC701B LC701G LC701R LC713	616K6965	NOISE FILTER TX09500NBT
LC741	616K6966	NOISE FILTER
*** PWB ASSYS ***		
	84R69A01	SW MAIN PWB ASSY
	84R69C01	VIDEO PWB ASSY
	84R69D03	DEF PWB ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***		
HD555	31709503	SHEET,INSULATOR
HQ554	31709507	SHEET,INSULATOR HEAT SINK
SG901B SG901G SG901R SG902	329J0214	ARRESTER(200V),AT52
	32990205	INSUIATING CAP TIC-3.5(
	32990234	BNC/D-SUB PANEL
X801	64098039	X'TAL(10.000MHZ)
⚠F601	66699064	FUSE UL(ET) 250V 4A
SG903 ⚠SG951	667K6007	SPARK GAP 1.5KV
CN-CRT	70032058	CRT SOCKET(HPS0440)
IN601	70521064	AC RECEPTACLE
CABLE	73893226	SIGNAL CABLE D15P-MD15P K
CORD	75513033	POWER CORD
⚠ICD5P1	79644121	HV CONTROL UNIT
⚠IC2001	79644181	HV PROTECTOR

SYMBOL	PARTS NO	DESCRIPTION
⚠T5R1	47105709	FBT
⚠T561	47710020	TRANS,H.OUTPUT(W422)
*** VARIABLE RESISTORS ***		
VR582	410G1407	R,VARIABLE B1K
VR7E1	410G1412	R,VARIABLE B6.8K-T
VR401	410G1415	R,VARIABLE B22K-T
⚠VR5R1	415K5163	R,VARIABLE B200K
VR6A1	41505153	R,VARIABLE B500
*** RELAYS & SWITCHES ***		
SW582	65161081	SWITCH SLIDE 00220867
⚠SW601	65360060	PUSH SWITCH ESB91631AXL
SW108	65360067	PUSH SWITCH ESB30
SW101 SW102 SW103 SW104 SW105 SW106 SW107	65361012	PUSH SWITCH
⚠RL581	65660045	RELAY DSBT2-M-2D-DC12V
RL851	65660046	RELAY OSA-SS-212DM5
⚠RL601 ⚠RL602	65690001	RELAY G5P-1
*** COILS & FILTERS ***		
LC791 LC791B LC791G LC791R	390J9027	FILTER ZJSC-R12-100TA
MRC801 MRC802	39040002	RC,NETWORK 10K 1K 0.01UF
MRC803	39040003	RC,NETWORK 1K 0.01UF
MRC581	39099069	ARCL11S101J104Z
⚠L581	60919175	COIL,H.LIN 20T
L791	610E1711	COIL,FILTER 3.3UH
L602	610E1722	COIL,FILTER 27UH
L701B L701G L701R	610E1726	COIL,FILTER 56UH
L591 L593 L761	610F3025	COIL,FILTER 47UH
⚠L584	610F3041	COIL,FILTER 1000UH
L6A7 L6A8 L6A9 L6E1	610F5002	FERRITE BEADS (B-02-RT)
L901B L901G L901R	610F6503	COIL,FILTER 0.15UH
L601 L604	610G0111	INDUCTOR,BEADS(FBR07HA121
⚠L5P1	610G0233	FILTER CHOKE PJ8T-470K
⚠L5P2	610G0242	FILTER CHOKE PJ8T-100M
L6A2 L6A3 L6A5	610G0257	COIL,CHOKE 33UH

SYMBOL	PARTS NO	DESCRIPTION
*** APPEARANCE PARTS ***		
	25320061	CABINET BACK
	25320211	CABINET FRONT ASSY(AG)
	25427941	REVOLVING STAND ASSY
	25546391	CHASSIS BASE
	25757643	LABEL(REV.)
	25785091	NAME PLATE,INSTRUCTION
	25852641	SCREW,SPECIAL(5*25)
*** PRINTED & PACKING MATERIALS ***		
	24813191	BAG,POLYETHYLENE(150*370)
	25833121	CARTON BOX(CN510R)
	25833481	FILLER(T),CARTON
	25833491	FILLER(B),CARTON
	25833831	SHEET PROTECTION
	25846051	PLATE,PULL OUT(CN510)
	78131631	P1150(B) USER'S MANUAL
*** RESISTORS ***		
J35 J62 J63	40AAD100	R,CHIP 0.0H 5% 1/2W
R443	40AAD124	R,CHIP 9.1H 5% 1/2W
R904	40AAD133	R,CHIP 22H 5% 1/2W
R425	40AAD141	R,CHIP 47H 5% 1/2W
R716B R716G R716R	40AAD161	R,CHIP 330H 5% 1/2W
R724	40AAD163	R,CHIP 390H 5% 1/2W
R709B R709G R709R	40AAD169	R,CHIP 680H 5% 1/2W
R50M	40AAD181	R,CHIP 2.2K 5% 1/2W
R784	40AAD221	R,CHIP 100K 5% 1/2W
J005 J006 J007 J10 J11 J14 J15 J16 J17 J18 J19 J20 J21 J22 J23 J25 J27 J28 J29 J3 J30 J31 J32 J4 J5 J51 J52 J53 J54 J55 J56 J57 J58 J59 J6 J60	40AA1000	R,CHIP 0H 5% 1/8W

SYMBOL			PARTS NO	DESCRIPTION
J61	J64	J65	40AA1000	R,CHIP 0H 5% 1/8W
J66	J67	J68		
J69	J70	J71		
J72	J73	J74		
J81				
R58P			40AA1165	R,CHIP 470H 5% 1/8W
R527			40AA1173	R,CHIP 1.0K 5% 1/8W
R58R			40AA1209	R,CHIP 33K 5% 1/8W
R529			40AA1215	R,CHIP 56K 5% 1/8W
R430	R445	R8H8	40AA2005	R,CHIP 2.2H 5% 1/4W
R8J6				
R672	R674		40AA2149	R,CHIP 100H 5% 1/4W
R648			40AA2151	R,CHIP 120H 5% 1/4W
R7E2A	R714B	R714G	40AA2161	R,CHIP 330H 5% 1/4W
R714R				
R7E3A			40AA2167	R,CHIP 470H 5% 1/4W
R70EB	R70EG	R70ER	40AA2169	R,CHIP 680H 5% 1/4W
R706B	R706G	R706R		
R769	R772	R773	40AA2173	R,CHIP 1.0K 5% 1/4W
R744B	R744G	R744R	40AA2209	R,CHIP 33K 5% 1/4W
R743B	R743G	R743R	40AA2219	R,CHIP 82K 5% 1/4W
R742B	R742G	R742R	40AA2227	R,CHIP 180K 5% 1/4W
R741B	R741G	R741R	40AA2229	R,CHIP 220K 5% 1/4W
R746			40AA2233	R,CHIP 330K 5% 1/4W
R7G3	R7G8	R70G	40AA3000	R,CHIP 0.0H 5% 1/10W
R70K	R70L	R70M		
R703B	R703G	R703R		
R704B	R704G	R704R		
R732	R733	R75K		
R75L	R75P	R75R		
R75T	R793	R794		
R795	R966			
R431	R446		40AA3109	R,CHIP 2.2H 5% 1/10W
R58N	R638	R8J2	40AA3125	R,CHIP 10H 5% 1/10W
R8H4			40AA3129	R,CHIP 15H 5% 1/10W
R70FB	R70FG	R70FR	40AA3133	R,CHIP 22H 5% 1/10W
R646	R647		40AA3135	R,CHIP 27H 5% 1/10W
R639	R722B	R722G	40AA3137	R,CHIP 33H 5% 1/10W
R722R				
R50H			40AA3141	R,CHIP 47H 5% 1/10W
R7K2	R7K4		40AA3143	R,CHIP 56H 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R70AB	R70AG	R70AR	40AA3145	R,CHIP 68H 5% 1/10W
R8A3	R8A4		40AA3146	R,CHIP 75H 5% 1/10W
R512	R628	R635	40AA3149	R,CHIP 100H 5% 1/10W
R7A5	R7A6	R7A7		
R7A8	R705B	R705G		
R705R	R725B	R725G		
R725R				
R708B	R708G	R708R	40AA3151	R,CHIP 120H 5% 1/10W
R715B	R715G	R715R		
R717B	R717G	R717R		
R518			40AA3153	R,CHIP 150H 5% 1/10W
R7F1			40AA3159	R,CHIP 270H 5% 1/10W
R6F3	R7H1	R7H2	40AA3161	R,CHIP 330H 5% 1/10W
R7H3	R7H4			
R6F1			40AA3163	R,CHIP 390H 5% 1/10W
R522	R526	R671	40AA3167	R,CHIP 560H 5% 1/10W
R7G7			40AA3169	R,CHIP 680H 5% 1/10W
R426	R5K1	R5K2	40AA3173	R,CHIP 1.0K 5% 1/10W
R5K3	R5L1	R501		
R502	R503	R504		
R505	R506	R508		
R509	R511	R515		
R521	R528	R531		
R532	R6G2	R645		
R666	R7E4	R7F7		
R7F8	R7F9	R7N1		
R71E	R71G	R71H		
R71LB	R71LG	R71LR		
R731	R745B	R745G		
R745R	R75A	R75E		
R75F	R75G	R75H		
R754	R756	R757		
R758	R759	R799		
R961	R974	R981		
R525	R7E2E	R7K1	40AA3175	R,CHIP 1.2K 5% 1/10W
R7K3				
R71F			40AA3177	R,CHIP 1.5K 5% 1/10W
R641	R901B	R901G	40AA3179	R,CHIP 1.8K 5% 1/10W
R901R				
R637	R643	R669	40AA3181	R,CHIP 2.2K 5% 1/10W
R7E6	R7F6	R7G6		
R7N2	R7N5	R71K		

SYMBOL			PARTS NO	DESCRIPTION
R797			40AA3181	R,CHIP 2.2K 5% 1/10W
R665	R7E2B		40AA3183	R,CHIP 2.7K 5% 1/10W
R520	R6G3	R7H5	40AA3185	R,CHIP 3.3K 5% 1/10W
R7H6	R7H7	R7H8		
R85H	R85K	R85L		
R85M	R85N	R85P		
R796			40AA3187	R,CHIP 3.9K 5% 1/10W
R5L6	R50L	R6F2	40AA3189	R,CHIP 4.7K 5% 1/10W
R6F6	R7N6	R70N		
R75N				
R785			40AA3191	R,CHIP 5.6K 5% 1/10W
R753			40AA3193	R,CHIP 6.8K 5% 1/10W
R6G4			40AA3195	R,CHIP 8.2K 5% 1/10W
R5K0	R5K8	R5K9	40AA3197	R,CHIP 10K 5% 1/10W
R5L3	R5L4	R50G		
R50J	R534	R6F8		
R622	R623	R624		
R627	R629	R630		
R633	R634	R642		
R644	R649	R661		
R663	R664	R667		
R668	R7E3	R7E5		
R7F2	R7G1	R7G2		
R7N7	R70H	R707B		
R707G	R707R	R75M		
R752	R771	R774		
R775	R781	R782		
R783	R788	R79A		
R798	R8A5	R8A6		
R8A7	R8A9	R964		
R982				
R405	R625		40AA3201	R,CHIP 15K 5% 1/10W
R5L7			40AA3204	R,CHIP 20K 5% 1/10W
R6F7	R7E1	R7N8	40AA3205	R,CHIP 22K 5% 1/10W
R50K	R8A2		40AA3207	R,CHIP 27K 5% 1/10W
R523	R6F9	R650	40AA3209	R,CHIP 33K 5% 1/10W
R7A9				
R626			40AA3211	R,CHIP 39K 5% 1/10W
R7N3	R7N4	R79E	40AA3213	R,CHIP 47K 5% 1/10W
R8A1	R8A8			
R632			40AA3215	R,CHIP 56K 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R620			40AA3217	R,CHIP 68K 5% 1/10W
R621	R631		40AA3223	R,CHIP 120K 5% 1/10W
R6F4			40AA3229	R,CHIP 220K 5% 1/10W
R7A1	R7A2	R7A3	40AA3233	R,CHIP 330K 5% 1/10W
R7A4				
R786	R787		40AA3242	R,CHIP 750K 5% 1/10W
R636	R662		40AA3245	R,CHIP 1.0M 5% 1/10W
R50E			40AB1179	R,CHIP 1.8K 1% 1/8W
R427			40AB2128	R,CHIP 13H 1% 1/4W
R701B	R701G	R701R	40AB2146	R,CHIP 75H 1% 1/4W
R702B	R702G	R702R		
R475			40AB2187	C,CER,CHIP 3.9K 1% 1/4W
R8J5			40AB3126	R,CHIP 11H 1% 1/10W
R8H7			40AB3131	R,CHIP 18H 1% 1/10W
R712			40AB3145	R,CHIP 68H 1% 1/10W
R514			40AB3149	R,CHIP 100H 1% 1/10W
R718			40AB3155	R,CHIP 180H 1% 1/10W
R71A			40AB3161	R,CHIP 330H 1% 1/10W
R510			40AB3166	R,CHIP 510H 1% 1/10W
R50A			40AB3167	R,CHIP 560H 1% 1/10W
R984			40AB3171	R,CHIP 820H 1% 1/10W
R51G	R517		40AB3175	R,CHIP 1.2K 1% 1/10W
R52A			40AB3177	R,CHIP 1.5K 1% 1/10W
R422	R52E	R713	40AB3179	R,CHIP 1.8K 1% 1/10W
R516	R76A	R76F	40AB3180	R,CHIP 2.0K 1% 1/10W
R6F5	R792		40AB3182	R,CHIP 2.4K 1% 1/10W
R7G4	R719		40AB3183	R,CHIP 2.7K 1% 1/10W
R5L2			40AB3189	R,CHIP 4.7K 1% 1/10W
R7G5			40AB3191	R,CHIP 5.6K 1% 1/10W
R76E			40AB3192	R,CHIP 6.2K 1% 1/10W
R640	R969		40AB3193	R,CHIP 6.8K 1% 1/10W
R51H			40AB3194	R,CHIP 7.5K 1% 1/10W
R51A	R7F5		40AB3195	R,CHIP 8.2K 1% 1/10W
R519			40AB3196	R,CHIP 9.1K 1% 1/10W
R401	R403	R5K5	40AB3197	R,CHIP 10K 1% 1/10W
R51F				
R421	R95A	R951	40AB3198	R,CHIP 11K 1% 1/10W
R963				
R7F4			40AB3199	R,CHIP 12K 1% 1/10W
R5K6	R51K	R7F3	40AB3200	R,CHIP 13K 1% 1/10W

SYMBOL	PARTS NO	DESCRIPTION
R5K7	40AB3201	R,CHIP 15K 1% 1/10W
R513	40AB3203	R,CHIP 18K 1% 1/10W
R424 R442 R8H6	40AB3204	R,CHIP 20K 1% 1/10W
R8J4		
R7K5	40AB3205	R,CHIP 22K 1% 1/10W
R5L8	40AB3206	R,CHIP 24K 1% 1/10W
R51E	40AB3208	R,CHIP 30K 1% 1/10W
R5K4 R952 R953	40AB3209	R,CHIP 33K 1% 1/10W
R954 R955		
R670	40AB3211	R,CHIP 39K 1% 1/10W
R402 R404	40AB3212	R,CHIP 43K 1% 1/10W
R962	40AB3213	R,CHIP 47K 1% 1/10W
R423 R441 R8H3	40AB3214	R,CHIP 51K 1% 1/10W
R8J1		
R471	40AB3215	R,CHIP 56K 1% 1/10W
R472	40AB3218	R,CHIP 75K 1% 1/10W
R473 R474	40AB3225	R,CHIP 150K 1% 1/10W
R58L	40AC3129	R,CHIP 15H 5% 1W
R58M	40AC3131	R,CHIP 18H 5% 1W
R6G1	40AD4231	R,CHIP 270K 0.5% 1/10W
R6G0	40AD4247	R,CHIP 1.2M 0.5% 1/10W
R411	401CF601	R,CARBON 1.0H 5% 1/4W
R903	401CF649	R,CARBON 100H 5% 1/4W
R993	401CF693	R,CARBON 6.8K 5% 1/4W
R765	401CF699	R,CARBON 12K 5% 1/4W
R612 R615	401CF729	R,CARBON 220K 5% 1/4W
R682	401CF731	R,CARBON 270K 5% 1/4W
R684	401CF733	R,CARBON 330K 5% 1/4W
R85G	401CF755	R,CARBON 2.7M 5% 1/4W
R411	401C6601	R,CARBON 1.0H 5% 1/4W
⚠R5P4 ⚠R5P5	401C6633	R,CARBON 22H 5% 1/4W
R591	401C6641	R,CARBON 47H 5% 1/4W
R850	401C6643	R,CARBON 56H 5% 1/4W
R903	401C6649	R,CARBON 100H 5% 1/4W
R6A7	401C6657	R,CARBON 220H 5% 1/4W
R466 R905	401C6689	R,CARBON 4.7K 5% 1/4W
R993	401C6693	R,CARBON 6.8K 5% 1/4W
R617	401C6697	R,CARBON 10K 5% 1/4W
R765	401C6699	R,CARBON 12K 5% 1/4W
R5B1 R5B4	401C6727	R,CARBON 180K 5% 1/4W

SYMBOL	PARTS NO	DESCRIPTION
R462 R5E1 R5E3	401K5689	R,CARBON 4.7K 5% 1/6W
R6E8		
R5A7	401K5691	R,CARBON 5.6K 5% 1/6W
R4A9 R4C1 R467	401K5695	R,CARBON 8.2K 5% 1/6W
R5H2 R592		
⚠R2003 R4E1 R4E3	401K5697	R,CARBON 10K 5% 1/6W
R5A3 R5B2 R5B3		
R5H4 R5H5 R5H6		
R611 R683 R808		
R809 R831 R832		
R841 R846 ⚠R85A		
R851 R857		
R5A4	401K5699	R,CARBON 12K 5% 1/6W
⚠R2005 R6E2	401K5705	R,CARBON 22K 5% 1/6W
⚠R2004	401K5707	R,CARBON 27K 5% 1/6W
R5A9 R5B5 R828	401K5713	R,CARBON 47K 5% 1/6W
R761	401K5717	R,CARBON 68K 5% 1/6W
R70NA ⚠R85C	401K5719	R,CARBON 82K 5% 1/6W
⚠R2002 R5A2 R6H1	401K5721	R,CARBON 100K 5% 1/6W
R608 R766 R85E		
R85F		
R990	401K5733	R,CARBON 330K 5% 1/6W
⚠R5F3	401K5735	R,CARBON 390K 5% 1/6W
R5H3	401K5737	R,CARBON 470K 5% 1/6W
R58A R58C R584	401K5739	R,CARBON 560K 5% 1/6W
R586 R588 R589		
R5A6	401K5745	R,CARBON 1.0M 5% 1/6W
R618	40216282	R,WIRE 10W 1.0H
⚠R602	40299144	R,WIRE 15H 5% 7W
R410	403F1101	R,METAL OXIDE 1H 5% 1W
R555	403F1149	R,METAL OXIDE 100H 5% 1W
R8J3	403F2147	R,METAL OXIDE 82H 5% 2W
R8H5	403F2151	R,METAL OXIDE 120H 5% 2W
R991	403F2215	R,METAL OXIDE 56K 5% 2W
R563	40371125	R,METAL 10H 5% 1W
R6E1	40371131	R,METAL 18H 5% 1W
R553	40371133	R,METAL 22H 5% 1W
R6A2	40371135	R,METAL 27H 5% 1W
R575	40371187	R,METAL 3.9K 5% 1W
R476	40371211	R,METAL 39K 5% 1W

SYMBOL	PARTS NO	DESCRIPTION
R612 R615	401C6729	R,CARBON 220K 5% 1/4W
R682	401C6731	R,CARBON 270K 5% 1/4W
R684	401C6733	R,CARBON 330K 5% 1/4W
R680 R685	401C6745	R,CARBON 1.0M 5% 1/4W
R85G	401C6755	R,CARBON 2.7M 5% 1/4W
⚠R985 ⚠R986	401G6141	R,CARBON 47H 5% 1/4W
R762	401G6189	R,CARBON 4.7K 5% 1/4W
⚠R5F2	401G6191	R,CARBON 5.6K 5% 1/4W
R564	401H5617	R,CARBON 4.7H 5% 1/2W
R902B R902G R902R	401H5633	R,CARBON 22H 5% 1/2W
R673	401H5647	R,CARBON 82H 5% 1/2W
R4A1	401H5663	R,CARBON 390H 5% 1/2W
R409	401H5675	R,CARBON 1.2K 5% 1/2W
⚠R995	401H5677	R,CARBON 1.5K 5% 1/2W
R461	401H5689	R,CARBON 4.7K 5% 1/2W
R859	401H5723	R,CARBON 120K 5% 1/2W
R601	401H5737	R,CARBON 470K 5% 1/2W
R711B R711G R711R	401JJ820	R,CARBON 0.0H
R711B R711G R711R	401J9820	R,CARBON 0.0H
R806 R987		
R593	401K5609	R,CARBON 2.2H 5% 1/6W
R989	401K5617	R,CARBON 4.7H 5% 1/6W
R552 R6E3	401K5625	R,CARBON 10H 5% 1/6W
R551 R58D	401K5649	R,CARBON 100H 5% 1/6W
R821	401K5653	R,CARBON 150H 5% 1/6W
R107	401K5655	R,CARBON 180H 5% 1/6W
R801 R802	401K5663	R,CARBON 390H 5% 1/6W
R468 R469	401K5665	R,CARBON 470H 5% 1/6W
R108 R109 R481	401K5673	R,CARBON 1.0K 5% 1/6W
R482 R484 R5E2		
R576 R577 R80A		
R807 R833 R844		
R847		
R848	401K5675	R,CARBON 1.2K 5% 1/6W
R558	401K5677	R,CARBON 1.5K 5% 1/6W
R408 R463 R483	401K5679	R,CARBON 1.8K 5% 1/6W
R5C9 R574 R852		
R5H1 R616	401K5681	R,CARBON 2.2K 5% 1/6W
R803 R804	401K5683	R,CARBON 2.7K 5% 1/6W
R5H7	401K5685	R,CARBON 3.3K 5% 1/6W

SYMBOL	PARTS NO	DESCRIPTION
⚠R5P3	40371331	R,METAL 0.27 5% 1W
⚠R5F1	40371343	R,METAL 0.82H 5% 1W
R860	40372111	R,METAL 2.7H 5% 2W
R7E1A	40372119	R,METAL 5.6H 5% 2W
R829	40372121	R,METAL 6.8H 5% 2W
R7E1B	40372129	R,METAL 15H 5% 2W
⚠R583	40372131	R,METAL 18H 5% 2W
R610	40372143	R,METAL 56H 5% 2W
R464	40372169	R,METAL 680H 5% 2W
R6A3 R6A4 R6E9	40372199	R,METAL 12K 5% 2W
R605 R606	40372213	R,METAL 47K 5% 2W
R6A6 R6A9	40372221	R,METAL 100K 5% 2W
R609	40373159	R,METAL 270H 5% 3W
R603 R604	40373211	R,METAL 39K 5% 3W
R607	40373333	R,METAL 0.33H 5% 3W
⚠R5P1 ⚠R5P2	40376151	R,METAL120H 5% 3W
R444	40378143	R,METAL 56H 5% 2W
⚠R581	40383028	R,METAL 180H 5% 3W
R554	40399092	R,METAL 1.2H 5% 5W
R110 R111	404CA670	R,METAL 750H 1% 1/6W
R407	404CA682	R,METAL 2.4K 1% 1/6W
R406	404CA696	R,METAL 9.1K 1% 1/6W
R767	404CA726	R,METAL 160K 1% 1/6W
R614	404CA741	R,METAL 680K 1% 1/6W
R613	404CA743	R,METAL 820K 1% 1/6W
R992	404C1669	R,METAL 680H 1% 1/6W
R110 R111	404C1670	R,METAL 750H 1% 1/6W
R407	404C1682	R,METAL 2.4K 1% 1/6W
R5A1	404C1683	R,METAL 2.7K 1% 1/6W
R6E7	404C1684	R,METAL 3.0K 1% 1/6W
R6E5 R6E6	404C1691	R,METAL 5.6K 1% 1/6W
R406	404C1696	R,METAL 9.1K 1% 1/6W
R4A3 R4A6 R4A7	404C1697	R,METAL 10K 1% 1/6W
R5C2 R556		
R5C4	404C1699	R,METAL 12K 1% 1/6W
R5A8	404C1700	R,METAL 13K 1% 1/6W
⚠R5R1 R768	404C1701	R,METAL 15K 1% 1/6W
R5A5 R560	404C1702	R,METAL 16K 1% 1/6W
R5C3	404C1703	R,METAL 18K 1% 1/6W
R5C6	404C1705	R,METAL 22K 1% 1/6W

SYMBOL	PARTS NO	DESCRIPTION
R5C8	404C1707	R,METAL 27K 1% 1/6W
R561	404C1708	R,METAL 30K 1% 1/6W
R4A8	404C1711	R,METAL 39K 1% 1/6W
R5C5 R681	404C1715	R,METAL 56K 1% 1/6W
⚠R5R2 ⚠R5R6 R686	404C1717	R,METAL 68K 1% 1/6W
R4A5 R6E4 R763	404C1719	R,METAL 82K 1% 1/6W
R5C7 ⚠R5R3	404C1721	R,METAL 100K 1% 1/6W
R4A4 R5C1 R764	404C1723	R,METAL 120K 1% 1/6W
R767	404C1726	R,METAL 160K 1% 1/6W
⚠R5R5	404C1729	R,METAL 220K 1% 1/6W
R614	404C1741	R,METAL 680K 1% 1/6W
R613	404C1743	R,METAL 820K 1% 1/6W
R751	404J9443	R,METAL 1.3K 0.5% 1/8W
⚠R2001 ⚠R562 ⚠R572	404K5109	R,METAL 2.2H 5% 1/4W
⚠R4F1 ⚠R465 ⚠R5G1 ⚠R994	404K5125	R,METAL 10H 5% 1/4W
⚠R5H8	404K5135	R,METAL 27H 5% 1/4W
R619	40405125	R,METAL 10H 5% 1/4W
R983	40499449	R,METAL 10K 2% 1W
R6H2 R6H3 R6H4	40499507	R,METAL 0.22H 5% 1/2W
R594	408A8107	R,FUSE 1.8H 5% 1/2W
⚠R6A8	4081J907	R,FUSE 1.0H 5% 2W

*** CAPACITORS ***

SYMBOL	PARTS NO	DESCRIPTION
C402 C6F2	42AA1509	C,CHIP CERAMIC 50V 1000PF
C629 C7N2	42AA1515	C,CHIP CERAMIC 50V 3300PF
C409	42AA1516	C,CHIP CERAMIC 50V 3900PF
C631 C792	42AA1517	C,CHIP CERAMIC 50V 4700PF
C5L3	42AA1520	C,CHIP CERAMIC 50V 8200PF
C623 C625 C635	42AA1521	C,CHIP CERAMIC 50V 0.01UF
C630 C632	42AA1523	C,CHIP CERAMIC 50V0.015UF
C751	42AA1527	C,CERAMIC 25V 0.01UF
C791	42AA1538	C,CERAMIC 25V 0.1UF
C624 C626 C628 C633 C636 C661 C662 C663 C773	42AA2721	C,CERAMIC 50V 0.1UF
C421 C422 C471 C7F4 C702B C702G C702R C704B C704G C704R C712B C712G	42AA2726	C,CERAMIC 50V 0.01UF

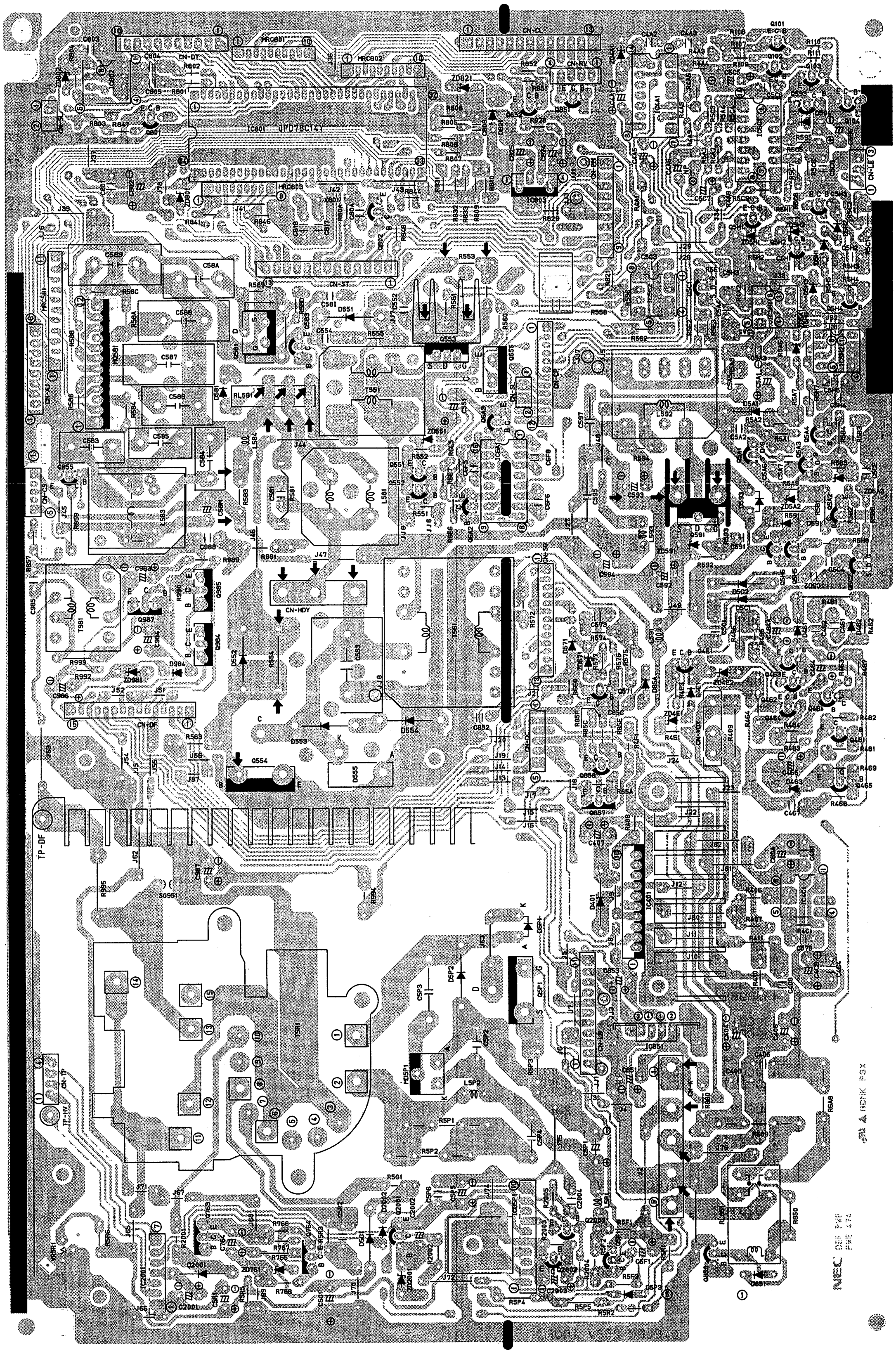
SYMBOL	PARTS NO	DESCRIPTION
⚠C581	420C9066	C,CERAMIC 500V 1800PF
C902	420C9551	C,CERAMIC 500V 100PF
C901	420C9557	C,CERAMIC 500V 330PF
C5A6	420C9561	C,CERAMIC 500V 680PF
C5A7	420C9562	C,CERAMIC 500V 820PF
C5A5 C742B C742G C742R C761 C985 C988	420C9563	C,CERAMIC 500V 1000PF
C5A2	420C9565	C,CERAMIC 500V 1500PF
C554	420C9567	C,CERAMIC 500V 2200PF
C552	420C9571	C,CERAMIC 500V 4700PF
C616	420DA014	C,CERAMIC 2KV 150PF
C904	420D0019	C,CERAMIC 2KV 1000PF
⚠C602 ⚠C603 ⚠C605 ⚠C606	420EC067	C,CERAMIC 250V 2200PF
⚠C607 ⚠C608	420EC071	C,CERAMIC 400V 4700PF
C6A5 C611	420JJ088	C,CERAMIC 2K 220PF
C726	420J9118	C,CERAMIC 500V 0.01UF
C903	42040108	C,CERAMIC 2KV 0.01UF
C4A2 C5H2 C808 C964	421A0425	C,CERAMIC 50V 0.01UF
C5H5 C510	421C0211	C,CERAMIC 50V 680PF
C85C	421C0212	C,CERAMIC 50V 820PF
C80A	421C0213	C,CERAMIC 50V 1000PF
⚠C2004 C4C2 C4C4 C403 C405 C5C3 C5C6 C5C8 C5H3 C5H4 ⚠C5P6 C58K C6F8 C801 C803 C852 C972	421D6009	C,CERAMIC 25V 0.1UF
C5A3	423A1101	C,CERAMIC 50V 470PF
C817 C818	423A2015	C,CERAMIC 50V 10PF
C804 C805	423A2037	C,CERAMIC 50V 47PF
C573 C958 C961 C966	423A2045	C,CERAMIC 50V 100PF
C462	423A2104	C,CERAMIC 50V 220PF
C989	423E2111	C,CERAMIC 500V 10PF
C5H1 C6F6	427F4601	C,FILM 50V 1000PF
C5K4	427F4602	C,FILM 50V 1200PF
C7F2	427F4607	C,FILM 50V 3300PF

SYMBOL	PARTS NO	DESCRIPTION
C712R C719 C8H4 C8H5 C957 C975 C982	42AA2726	C,CERAMIC 50V 0.01UF
C423 C430 C442 C5K0 C5K2 C5K7 C5K9 C50A C50C C50E C50F C50G C50P C50Q C501 C502 C503 C504 C505 C508 C509 C513 C516 C521 C523 C524 C526 C527 C531 C532 C7E1 C7E2 C7F5 C7H1 C7H2 C7H3 C7H5 C70A C70E C70KB C70KG C70KR C70PB C70PG C70PR C707B C707G C707R C708B C708G C708R C71A C71EB C71EG C71ER C714B C714G C714R C715B C715G C715R C717B C717G C717R C721B C721G C721R C732 C743B C743G C743R C744B C744G C744R C753 C754 C756 C757 C758 C759 C76A C766 C767 C79G C798 C8A2 C8H3 C8J2 C950 C953 C954 C965 C971 C973	42AA2744	C,CERAMIC 25V 0.1UF
C728B C728G C728R	42CA1416	C,CERAMIC 50V 10PF
C723B C723G C723R	42CA1428	C,CERAMIC 50V 33PF
C71G	42CA1432	C,CERAMIC 50V 47PF
C79F	42CA1438	C,CERAMIC 50V 82PF
C79K	42CA1444	C,CERAMIC 50V 150PF
C50J	42CA1452	C,CHIP 50V 330PF
C85E C85F C85G C854 C855 C856	42CA1456	C,CERAMIC 50V 470PF

SYMBOL	PARTS NO	DESCRIPTION
C514 C6F5	427F4609	C,FILM 50V 4700PF
C6A1	427F4617	C,FILM 50V 0.022UF
C467	427F4620	C,FILM 50V 0.039UF
⚠C5R2 C6F1 C614 C7A9	427F4625	C,FILM 50V 0.1UF
C7A6 C7A7 C7F1	427F4629	C,FILM 50V 0.22UF
C520	427F4651	C,FILM 50V 1000PF
C5K5	427F4693	CQ93M1H471J,BT
⚠C5P4	42703458	C,FILM 630V 3900PF
C7A1 C7A3 C771	428B3013	C,METAL FILM 50V 0.1UF
C5A4	428B3017	C,METAL FILM 50V 0.22UF
C4A3 C5C1	428B3021	C,METAL FILM 50V 0.47UF
C5K3 C5L2	428B3617	C,METAL 50V 0.22UF
C506	428B3619	C,METAL 50V 0.33UF
C5C2	428C9001	C,METAL FILM 100V 0.068UF
C461	428C9022	C,METAL FILM 250V 0.1UF
⚠C5P2	428DE025	C,METAL 100V 1.0UF
C472	428D0081	C,METAL 250V 0.01UF
C465 C724B C724G C724R	428D0097	C,FILM 250V 0.22UF
C610	428D0165	C,FILM 400V 0.022UF
C408	428D4317	C,METAL FILM 100V 0.22UF
C591	428D5093	C,METAL 250V 0.1UF
⚠C5P3	42808501	C,METAL FILM 1.6KV 1000PF
⚠C584 ⚠C585	42816354	C,FILM 250V 0.18UF 5%
⚠C586	42816358	C,FILM 250V 0.33UF 5%
⚠C58A	42816360	C,FILM 250V 0.39UF 5%
⚠C589	42816361	C,FILM 250V 0.47UF 5%
⚠C588	42816362	C,FILM 250V 0.56UF 5%
⚠C583	42816378	C,FILM 250V 0.16UF 5%
⚠C587	42816384	C,FILM 250V 0.62UF 5%
⚠C601	42824861	C,FILM 250V 0.47UF
C615	42840241	C,METAL 630V 0.47
C595 C597	42898004	C,METAL 250V 1.5UF
⚠C604 ⚠C613	42899098	C,FILM 250V 0.1UF
⚠C553	42899175	C,METAL 2.0KV 5600P
C7F6	430B6016	C,ELEC 10V 100UF
C7N4 C70T	430B6028	C,ELEC 16V 47UF
C70LB C70LG C70LR	430B6029	C,ELEC 16V 100UF

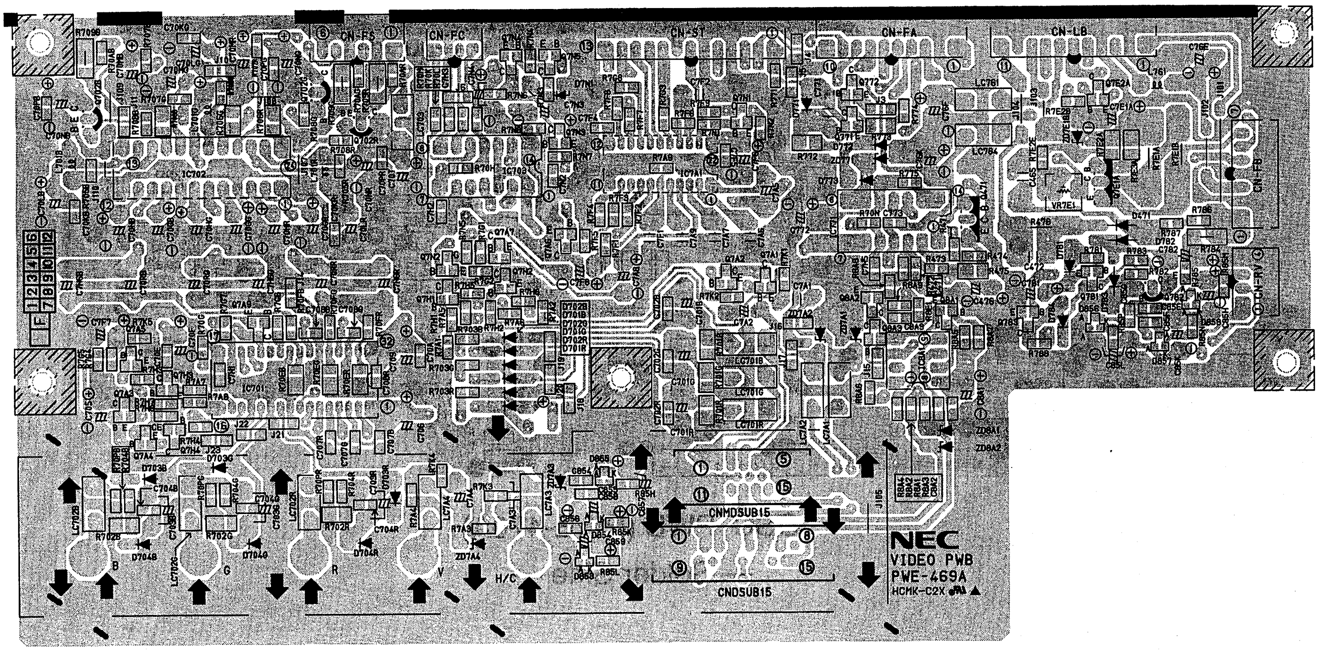
SYMBOL	PARTS NO	DESCRIPTION
C76F	430B6029	C,ELEC 16V 100UF
C781	430B6030	C,ELEC 16V 220UF
C802	430B6032	C,ELEC 16V 470UF
C7E1A	430B6039	C,ELEC 25V 22UF
C464 C464A C533	430B6041	C,ELEC 25V 47UF
C5C7 C7A8 C7F8	430B6061	C,ELEC 50V 1.0UF
C4A5 C466 C7N3	430B6065	C,ELEC 50V 10UF
C70GB C70GG C70GR		
C70HB C70HG C70HR		
C70MB C70MG C70MR		
C986		
C4A1	430B6067	C,ELEC 50V 33UF
C76E	430B6099	C,ELEC 100V 22UF
C782	430B6553	C,ELEC 250V 2.2UF
C476 C70F C705	430B8144	C,ELEC 16V 47UF
C706 C8A1		
C709	430B8145	C,ELEC 16V 100UF
C85H C85K C85L	430B8177	C,ELEC 50V 3.3UF
C857 C858 C859		
C7F7	430B8179	C,ELEC 50V 10UF
⚠C2003 ⚠C5F1 C6E8	430B9016	C,ELEC 10V 100UF
C58P C76H C79E	430B9017	C,ELEC 10V 220UF
C6E7	430B9020	C,ELEC 10V 1000UF
C772	430B9026	C,ELEC 16V 22UF
C713B C713G C713R	430B9028	C,ELEC 16V 47UF
C752 C765		
C525 C71F	430B9029	C,ELEC 16V 100UF
C722 C76G	430B9030	C,ELEC 16V 220UF
C6E3	430B9033	C,ELEC 16V 1000UF
C622	430B9038	C,ELEC 25V 10UF
C4C3 C425 C426	430B9041	C,ELEC 25V 47UF
⚠C5P5 C50B C50D		
C612 C952 C955		
C76K C851 C853	430B9042	C,ELEC 25V 100UF
C4C1 C627	430B9043	C,ELEC 25V 220UF
C6E2 C6E5	430B9045	C,ELEC 25V 470UF
C637 C793 C963	430B9061	C,ELEC 50V 1.0UF
C515 C519 C621	430B9062	C,ELEC 50V 2.2UF
C711B C711G C711R	430B9063	C,ELEC 50V 3.3UF
⚠C5R1 C634 C824	430B9065	C,ELEC 50V 10UF
C825	430B9065	C,ELEC 50V 10UF
⚠C2001	430B9066	C,ELEC 50V 22UF
C664	430B9069	C,ELEC 50V 100UF
C407	430B9070	C,ELEC 50V 220UF
C404 C406	430B9071	C,ELEC 50V 330UF
C983	430B9085	C,ELEC 63V 47UF
⚠C987	430B9098	C,ELEC 100V 10 UF
C727 C984	430B9101	C,ELEC 100V 47UF
C741B C741G C741R	430B9512	C,ELEC 160V 1.0UF
C764	430B9514	C,ELEC 160V 3.3UF
⚠C5G1 C762	430B9516	C,ELEC 160V 10UF
C5A1	430B9554	C,ELEC 250V 3.3UF
C976	430C0136	C,ELEC 10V 47UF
C5K8 C507 C718B	430C0244	C,ELEC 16V 47UF
C718G C718R		
C5K1	430C0245	C,ELEC 16V 100UF
C528	430C0261	C,ELEC 35V 4.7UF
C50K	430C0275	C,ELEC 50V 1.0UF
C716B C716G C716R	430C0276	C,ELEC 50V 2.2UF
C956 C974	430C0278	C,ELEC 50V 4.7UF
C512	430C0279	C,ELEC 50V 10UF
C534	430C8522	C,ELEC 25V 330UF
C594	430JH107	C,ELEC 250V 4.7UF
C6E6	4302J046	C,ELEC 25V 1000UF
C6E1 C6E9	4302J047	C,ELEC 25V 2200UF
C6A8	4302J102	C,ELEC 100V 100UF
C6A7	4302J105	C,ELEC 100V 470UF
C6A4	4302J559	C,ELEC 250V 47UF
C6A3	4302J560	C,ELEC 250V 100UF
C745	43029518	C,ELEC 160V 33UF
C592	43029558	C,ELEC 250V 33UF
C551	43049048	C,ELEC 35V 1000UF
⚠C5P1	4309J196	C,ELEC 100V 120UF
C593	43099232	C,ELEC 250V 10UF
⚠C609	43113184	C,ELEC 400V 560UF M
C7H6B C7H6G C7H6R	433A4027	C,ELEC 16V 220UF
C70RB C70RG C70RR		
C981	433A4033	C,ELEC 25V 10UF
C7A2 C7A5	433A4056	C,ELEC 50V 2.2UF
C701B C701G C701R	433A6147	C,ELEC 16V 47UF
C703B C703G C703R	433A6147	C,ELEC 16V 47UF
C7A4	433A6179	C,ELEC 50V 2.2UF
⚠C2002	433A7002	C,ELEC 10V 47UF
C522	433A7013	C,ELEC 16V 47UF
⚠C58M C58R	433A7014	C,ELEC 16V 100UF
C4A6	433A7046	C,ELEC 50V 10UF

PRINTED WIRING BOARDS

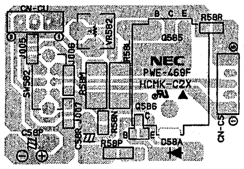


DEF PWB (PWE-474)

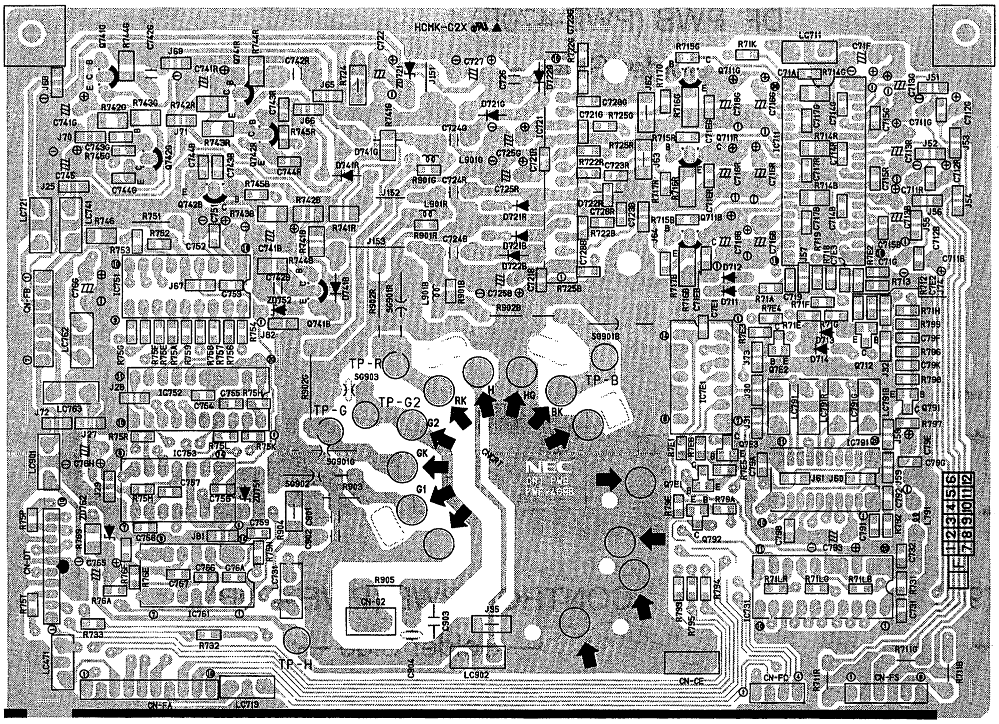
— Solder Side —


NEC
VIDEO PWB
PWE-469A
HCMK-C2X
CNMDSUB15
CNDSUB15
CN-FA
CN-LB
CN-FC
CN-FS
CN-ST
B
G
R
V
H/C

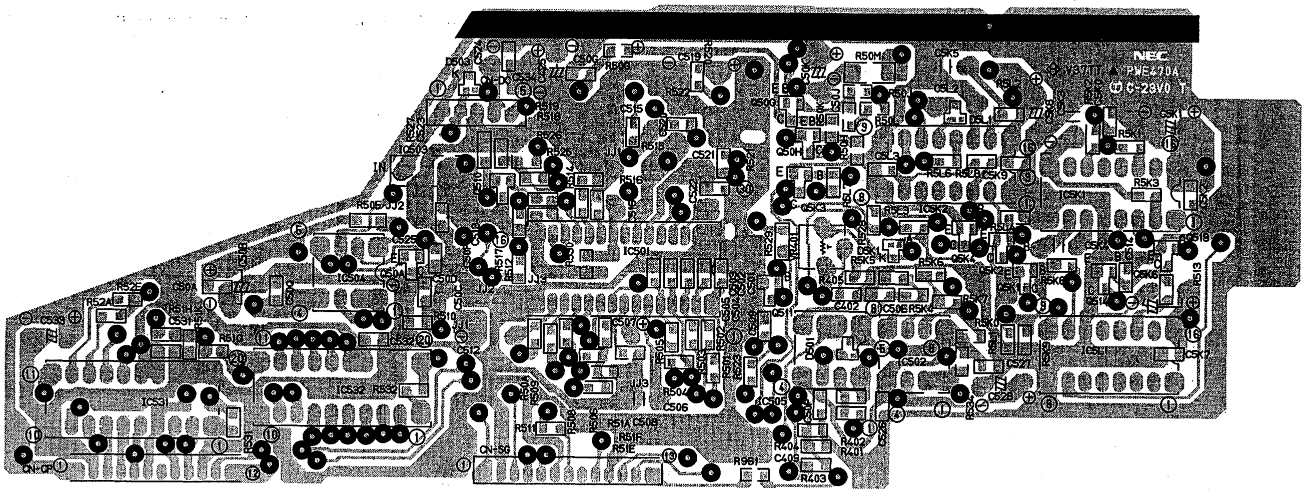
VIDEO PWB (PWE-469A)
— Solder Side —


NEC
PWE-469F
HCMK-C2X
CN-CU
CN-CS

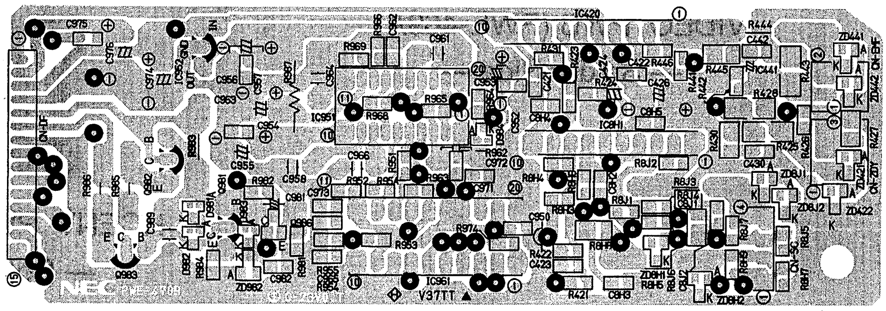
HCENT PWB (PWE-469F)
— Solder Side —


HCMK-C2X
NEC
CRT PWB
PWE-469B
TP-R
TP-G
TP-G2
TP-B
TP-H
CN-G2
CN-FA
CN-CE
CN-FC
CN-FS
CN-FB
CN-DT

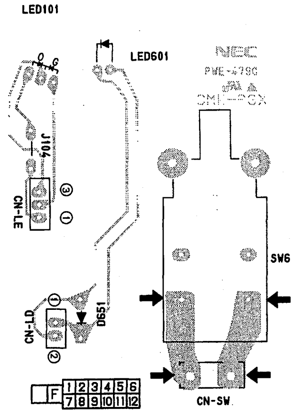
CRT PWB (PWE-469B)
— Solder Side —


NEC
PWE470A
V37TT
IC501
IC502
IC503
IC504
IC531
IC532
IC5K1
IC5L1
CN-GF
CN-SG

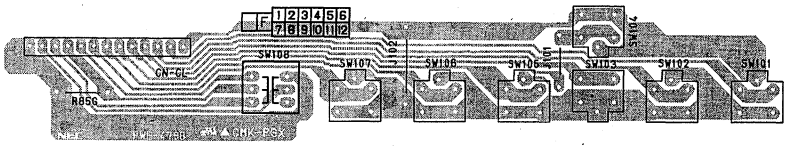
OSC PWB (PWE-470A)
— Solder Side —


IC420
IC951
IC961
IC8H1
CN-HD
CN-BHF
CN-SG
V37TT
NEC
PWE-470B

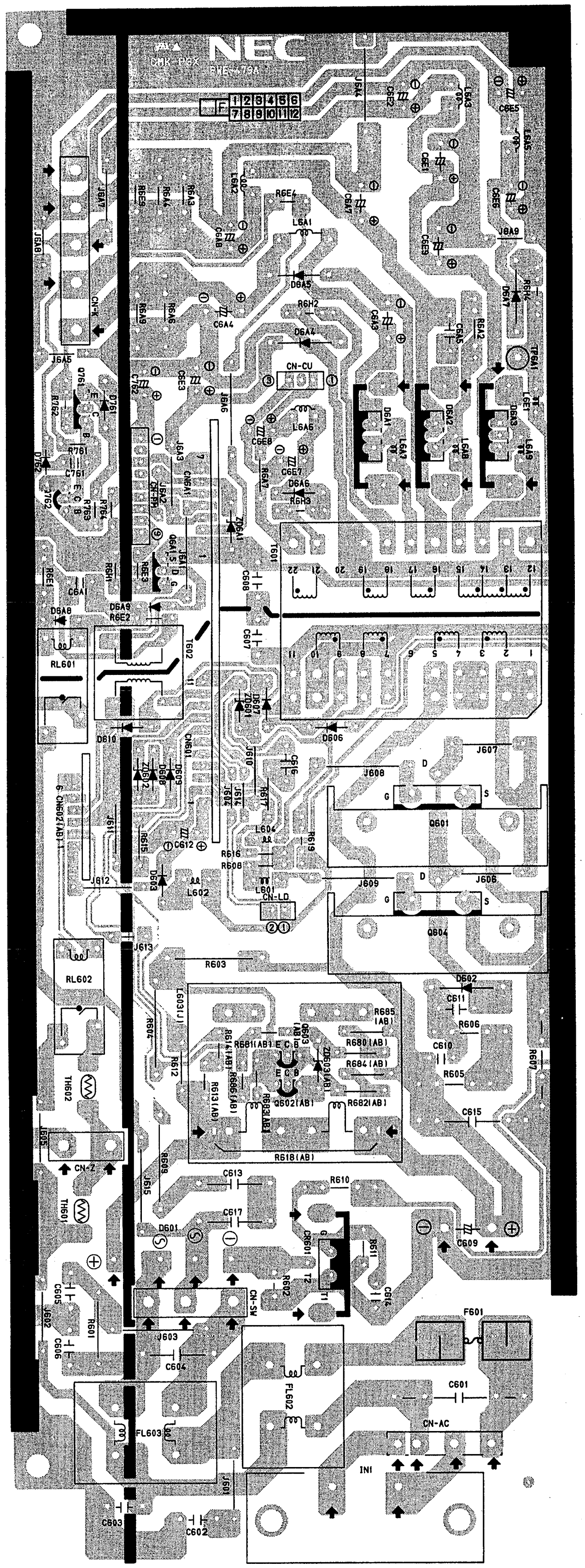
DF PWB (PWE-470B)
— Solder Side —


LED101
LED601
NEC
PWE-479C
J104
CN-LE
SW601
CN-LD
D551
CN-SW
F
1 2 3 4 5 6
7 8 9 10 11 12

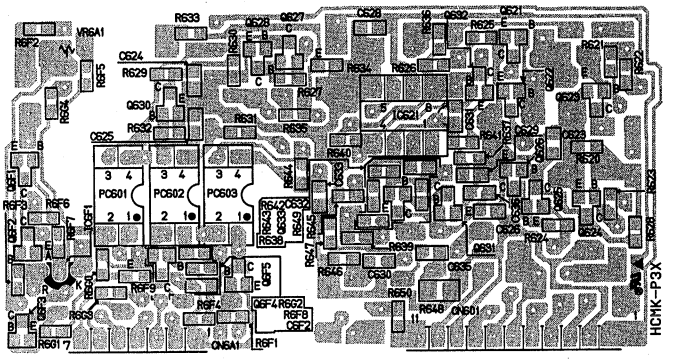
SW PWB (PWE-479C)
— Solder Side —


F
1 2 3 4 5 6
7 8 9 10 11 12
SW108
SW107
SW106
SW105
SW103
SW104
SW102
SW101
CN-GL
R856
NEC
PWE-479B

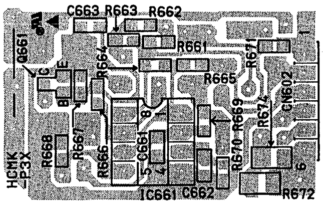
CONTROL PWB (PWE-479B)
— Solder Side —


NEC
CMK-P3X
PWE-479A
CN-CU
CN-LD
CN-Z
CN-SW
CN-AC
RL601
RL602
Q601
Q604
F601
FL602
FL603
T601
T602
TH601
TH602

SW. REG PWB (PWE-479A)
— Solder Side —


PC601
PC602
PC603
IC621
CN601
CN6A1
VR6A1
HCMK-P3X

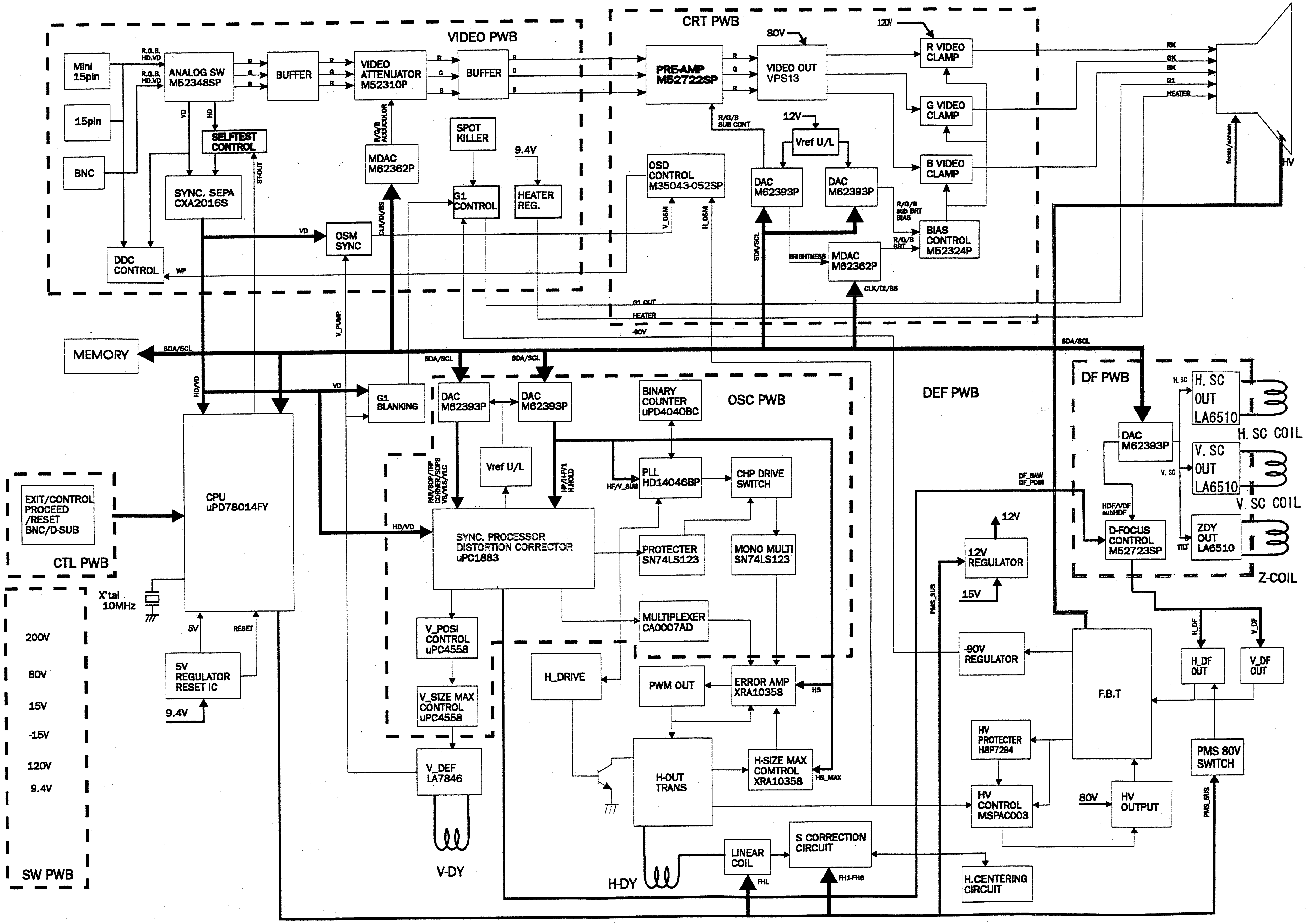
SW SUB PWB (PWE-473A)
— Solder Side —


C663
R663
R662
R661
R665
CN602
IC661
C662
R672
HCMK-P3X

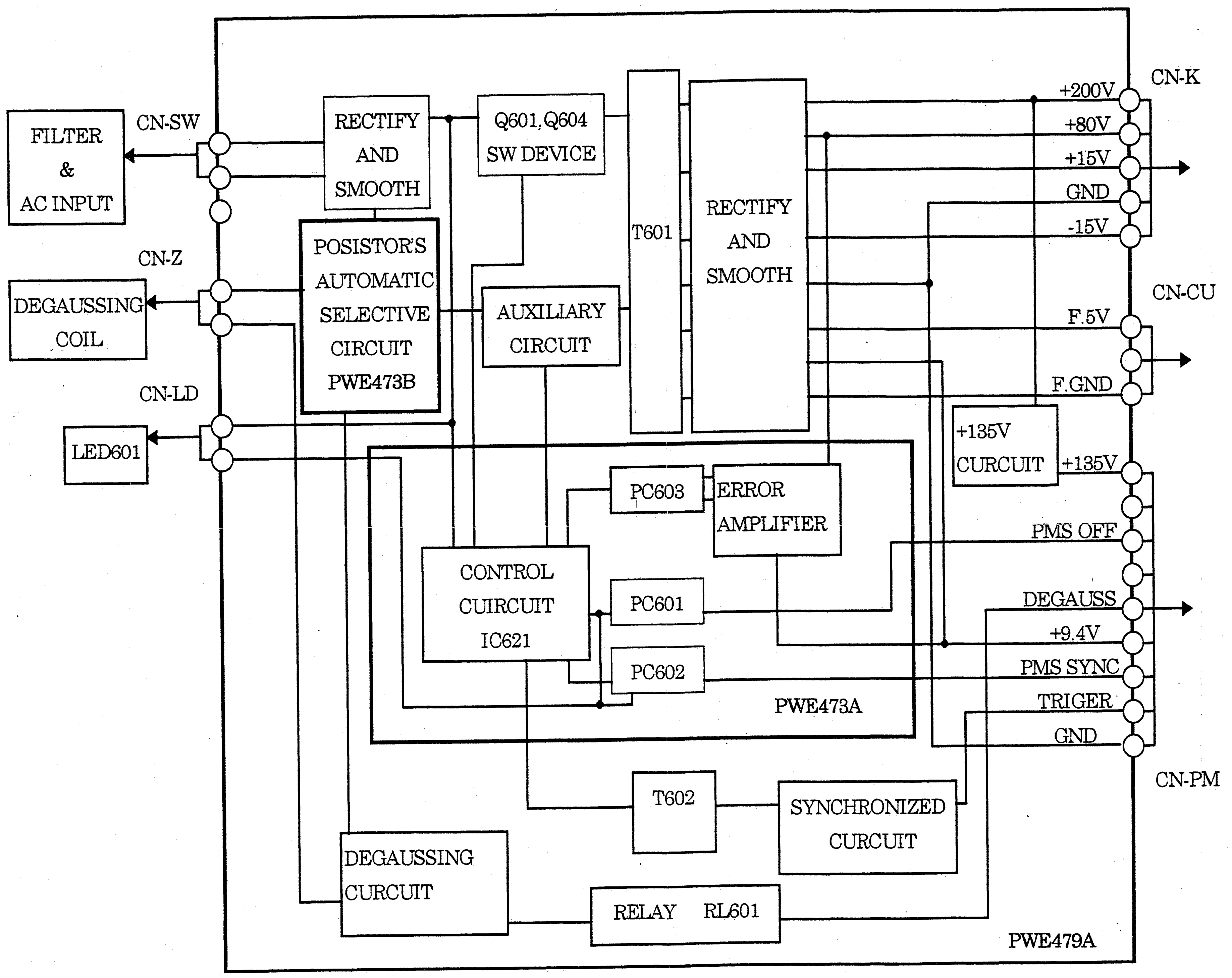
SW SUB PWB (PWE-473B)
— Solder Side —

MEMO

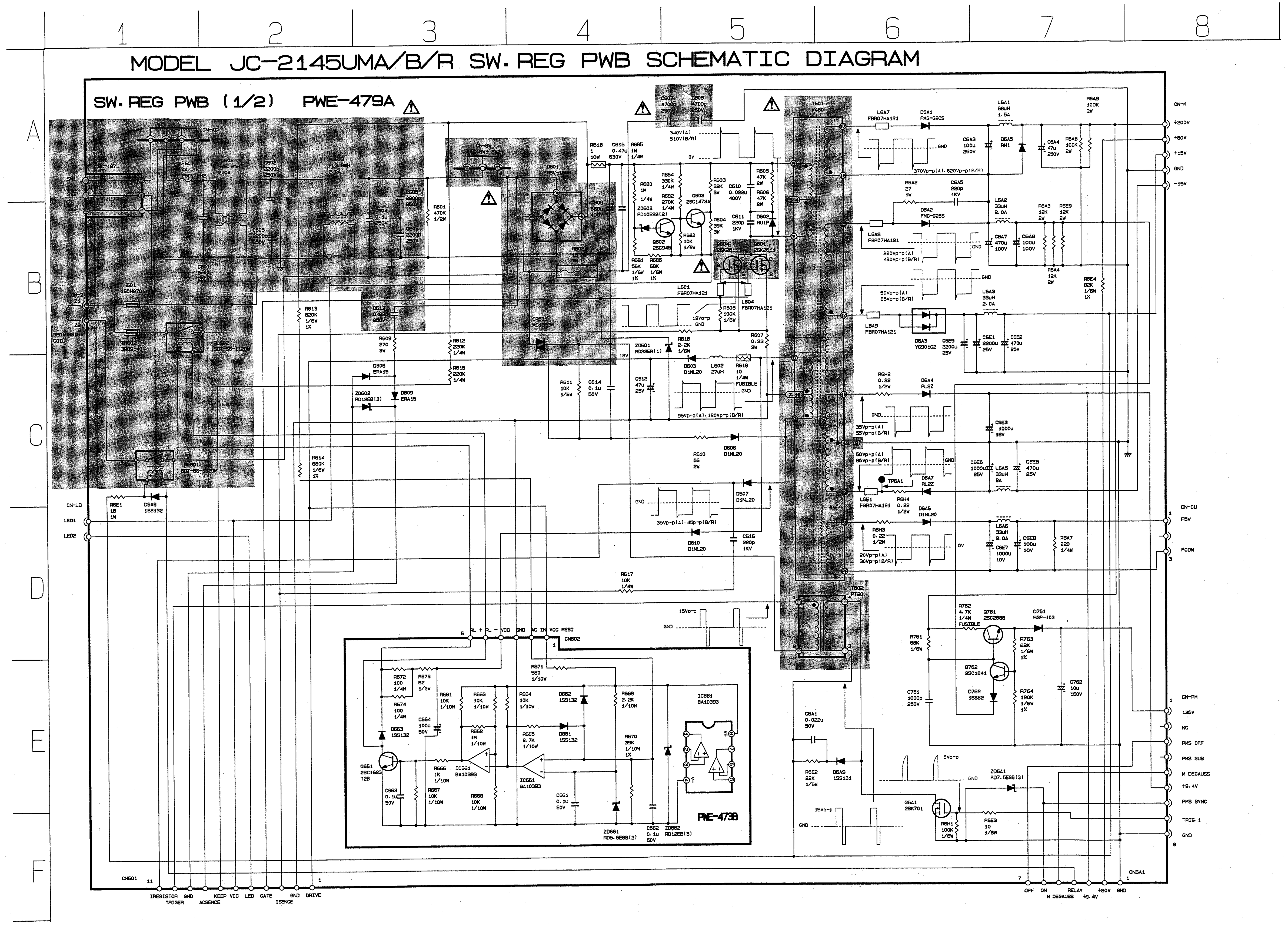
JC-2145UMA/B/R BLOCK DIAGRAMS


VIDEO PWB
Mini 15pin
15pin
BNC
R.G.B. HD.VD
R.G.B. HD.VD
ANALOG SW M52348SP
VD
HD
SELFTEST CONTROL
ST-OUT
SYNC. SEPA CXA2016S
DDC CONTROL
WP
BUFFER
R
G
B
VIDEO ATTENUATOR M52310P
R/G/B ACCUCOLOR
MDAC M62362P
CLK/DI/BS
OSM SYNC
VD
V_PUMP
BUFFER
SPOT KILLER
G1 CONTROL
9.4V
HEATER REG.
CRT PWB
80V
120V
PRE-AMP M52722SP
VIDEO OUT VPS13
R VIDEO CLAMP
G VIDEO CLAMP
B VIDEO CLAMP
R/G/B SUB CONT
12V
Vref U/L
OSD CONTROL M35043-052SP
V_OSM
H_OSM
DAC M62393P
DAC M62393P
SDA/SCL
R/G/B sub BRT BIAS
BIAS CONTROL M52324P
R/G/B BRT
BRIGHTNESS
MDAC M62362P
CLK/DI/BS
G1 OUT
HEATER
-90V
RK
GK
BK
G1
HEATER
focus/screen
HV
MEMORY
SDA/SCL
SDA/SCL
SDA/SCL
SDA/SCL
SDA/SCL
HD/VD
VD
G1 BLANKING
DAC M62393P
DAC M62393P
Vref U/L
PAR/SDP/TRP CORNER/SDPB VS/VLS/VLC
HP/H-FV1 H.HOLD
BINARY COUNTER uPD4040BC
OSC PWB
PLL HD14046BP
HF/V_SUB
CHP DRIVE SWITCH
HD/VD
SYNC. PROCESSOR DISTORTION CORRECTOR uPC1883
PROTECTER SN74LS123
MONO MULTI SN74LS123
MULTIPLEXER CA0007AD
EXIT/CONTROL PROCEED /RESET BNC/D-SUB
CTL PWB
CPU uPD78014FY
X'tal 10MHz
5V
RESET
5V REGULATOR RESET IC
9.4V
200V
80V
15V
-15V
120V
9.4V
SW PWB
V_POSI CONTROL uPC4558
V_SIZE MAX CONTROL uPC4558
V_DEF LA7846
V-DY
H_DRIVE
PWM OUT
ERROR AMP XRA10358
HS
H-OUT TRANS
H-SIZE MAX COMTROL XRA10358
HS_MAX
H-DY
LINEAR COIL
FHL
S CORRECTION CIRCUIT
FH1-FH6
DEF PWB
DF PWB
DF_SAW DF_POSI
12V
12V REGULATOR
15V
PMS_SUS
-90V REGULATOR
F.B.T
HV PROTECTER H8P7294
HV CONTROL MSPAC003
80V
HV OUTPUT
H.CENTERING CIRCUIT
DAC M62393P
H. SC
H. SC OUT LA6510
H. SC COIL
V. SC
V. SC OUT LA6510
V. SC COIL
HDF/VDF subHDF
D-FOCUS CONTROL M52723SP
TILT
ZDY OUT LA6510
Z-COIL
H_DF
V_DF
H_DF OUT
V_DF OUT
PMS 80V SWITCH
PMS_SUS

JC-2145UMA/B/R BLOCK DIAGRAMS (POWER SUPPLY PWB)

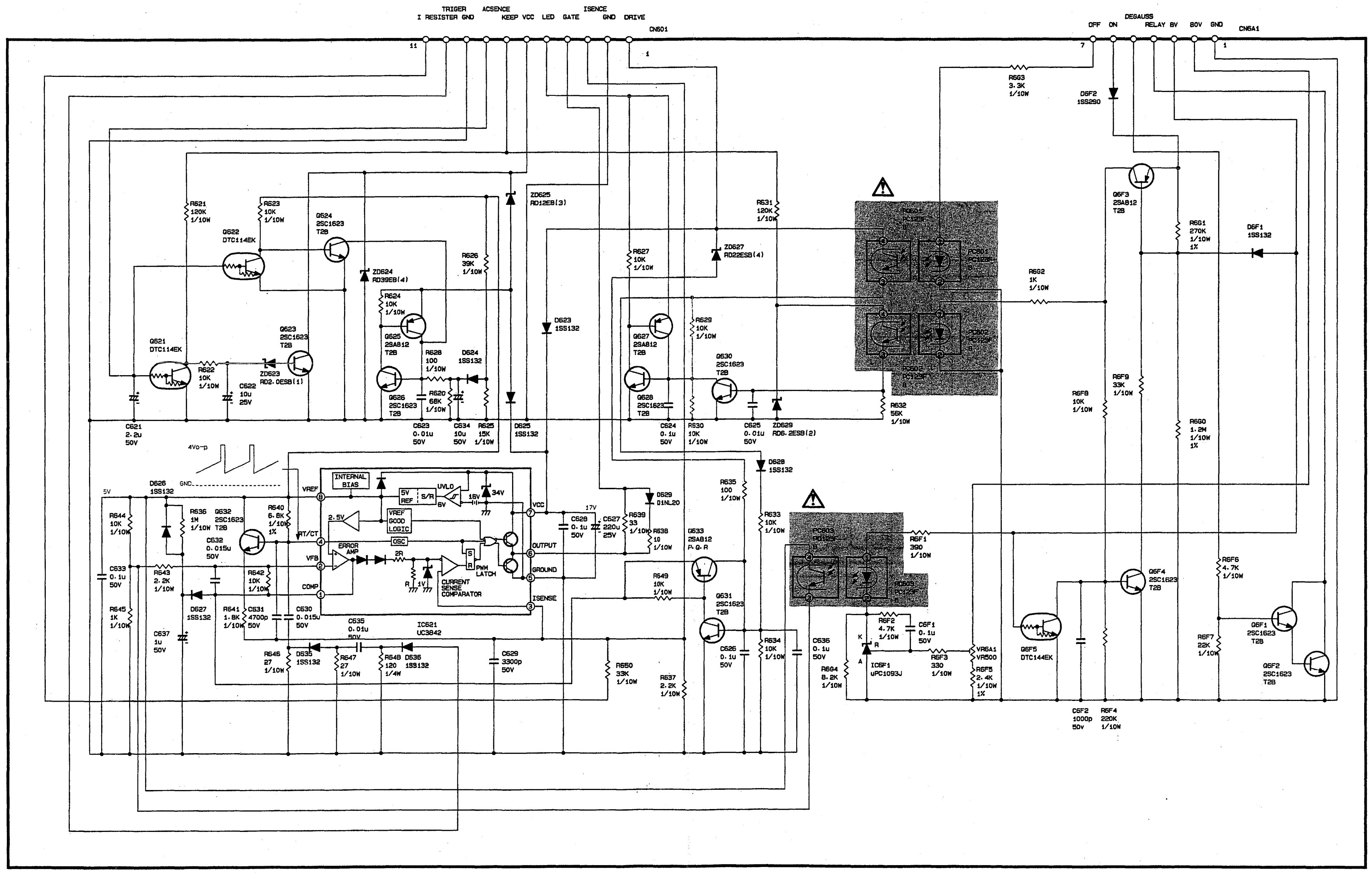

FILTER & AC INPUT
CN-SW
RECTIFY AND SMOOTH
Q601,Q604 SW DEVICE
T601
RECTIFY AND SMOOTH
+200V
+80V
+15V
GND
-15V
CN-K
CN-Z
DEGAUSSING COIL
POSISTOR'S AUTOMATIC SELECTIVE CIRCUIT PWE473B
AUXILIARY CIRCUIT
CN-CU
F.5V
F.GND
CN-LD
LED601
+135V CURCUIT
+135V
PC603
ERROR AMPLIFIER
PMS OFF
CONTROL CUIRCUIT IC621
PC601
DEGAUSS
+9.4V
PC602
PMS SYNC
PWE473A
TRIGER
GND
CN-PM
T602
SYNCHRONIZED CURCUIT
DEGAUSSING CURCUIT
RELAY RL601
PWE479A

MODEL JC-2145UMA/B/R SW. REG PWB SCHEMATIC DIAGRAM


1
2
3
4
5
6
7
8
A
B
C
D
E
F
SW. REG PWB (1/2) PWE-479A
CN-AC
CN-SW
T601
T602
L6A7 FBR07HA121
D6A1 FMG-G2CS
L6A1 68uH 1.5A
R6A9 100K 2W
C6A4 47u 250V
R6A6 100K 2W
R6A3 12K 2W
R6E9 12K 2W
R6A4 12K 2W
R6E4 82K 1/6W 1%
R6A7 220 1/4W
C762 10u 160V
D761 RGP-10G
Q761 2SC2688
Q762 2SC1841
R762 4.7K 1/4W FUSIBLE
R761 68K 1/6W
R763 82K 1/6W 1%
R764 120K 1/6W 1%
D762 1SS82
C761 1000p 250V
Q6A1 2SK701
ZD6A1 RD7.5ESB(3)
R6H1 100K 1/6W
R6E3 10 1/6W
C6A1 0.022u 50V
R6E2 22K 1/6W
D6A9 1SS131
R618 1 10W
C615 0.47u 630V
R685 1M 1/4W
R684 330K 1/4W
R682 270K 1/4W 1%
R680 1M 1/4W
ZD603 RD10ESB(2)
Q602 2SC945
Q603 2SC1473A
R683 10K 1/6W
R681 56K 1/6W 1%
R686 68K 1/6W 1%
R603 39K 3W
C610 0.022u 400V
R605 47K 2W
R606 47K 2W
R604 39K 3W
C611 220p 1KV
D602 RU1P
Q604 2SK2611
Q601 2SK2611
L601 FBR07HA121
L604 FBR07HA121
R608 100K 1/6W
R607 0.33 3W
ZD601 RD22EB(1)
R616 2.2K 1/6W
D603 D1NL20
L602 27uH
R619 10 1/4W FUSIBLE
C612 47u 25V
R611 10K 1/6W
C614 0.1u 50V
D606 D1NL20
R610 56 2W
D607 D1NL20
D610 D1NL20
C616 220p 1KV
R617 10K 1/4W
D601 RBV-1506
C609 560u 400V
R602 10 7W
CR601 AC10F6M
R613 820K 1/6W 1%
C613 0.22u 250V
R609 270 3W
R612 220K 1/4W
R615 220K 1/4W
D608 ERA15
ZD602 RD12EB(3)
D609 ERA15
R614 680K 1/6W 1%
R601 470K 1/2W
TH601 150H070A
TH602 390S140
RL602 SDT-SS-112DM
RL601 SDT-SS-112DM
DEGAUSSING COIL
R5E1 18 1W
D5A8 1SS132
CN-LD
LED1
LED2
C607 4700p 250V
C608 4700p 250V
340V(A) 510V(B/R)
370Vp-p(A) 520Vp-p(B/R)
280Vp-p(A) 430Vp-p(B/R)
50Vp-p(A) 85Vp-p(B/R)
95Vp-p(A) 120Vp-p(B/R)
35Vp-p(A) 45Vp-p(B/R)
35Vp-p(A) 55Vp-p(B/R)
50Vp-p(A) 85Vp-p(B/R)
20Vp-p(A) 30Vp-p(B/R)
15Vp-p
5Vp-p
GND
0V
C6A3 100u 250V
D6A5 RM1
R6A2 27 1W
C6A5 220p 1KV
D6A2 FMG-G26S
L6A2 33uH 2.0A
L6A8 FBR07HA121
C6A7 470u 100V
C6A8 100u 100V
L6A3 33uH 2.0A
L6A9 FBR07HA121
D6A3 YG901C2
C6E9 2200u 25V
C6E1 2200u 25V
C6E2 470u 25V
R6H2 0.22 1/2W
D6A4 RL2Z
C6E3 1000u 16V
C6E6 1000u 25V
L6A5 33uH 2A
C6E5 470u 25V
TP6A1
D6A7 RL2Z
L5E1 FBR07HA121
R6H4 0.22 1/2W
D6A6 D1NL20
R6H3 0.22 1/2W
L6A6 33uH 2.0A
C6E8 100u 10V
C6E7 1000u 10V
CN-K
+200V
+80V
+15V
GND
-15V
CN-CU
F6V
FCOM
CN-PM
135V
NC
PMS OFF
PMS SUS
M DEGAUSS
+9.4V
PMS SYNC
TRIG. 1
GND
CN6A1
OFF
ON
RELAY
M DEGAUSS
+9.4V
+80V
GND
6
RL +
RL -
VCC
GND
AC IN
VCC RESI
CN502
R572 100 1/4W
R573 82 1/2W
R574 100 1/4W
R671 560 1/10W
R661 10K 1/10W
R663 10K 1/10W
R664 10K 1/10W
D662 1SS132
R669 2.2K 1/10W
IC661 BA10393
D563 1SS132
C664 100u 50V
R662 1M 1/10W
R665 2.7K 1/10W
D661 1SS132
R670 39K 1/10W 1%
Q661 2SC1623 T2B
R666 1K 1/10W
R667 10K 1/10W
R668 10K 1/10W
C663 0.1u 50V
C661 0.1u 50V
ZD661 RD5.6ESB(2)
C662 0.1u 50V
ZD662 RD12EB(3)
PWE-473B
CN601
11
IRESISTOR
TRIGER
GND
ACSENCE
KEEP
VCC
LED
GATE
ISENCE
GND
DRIVE
1

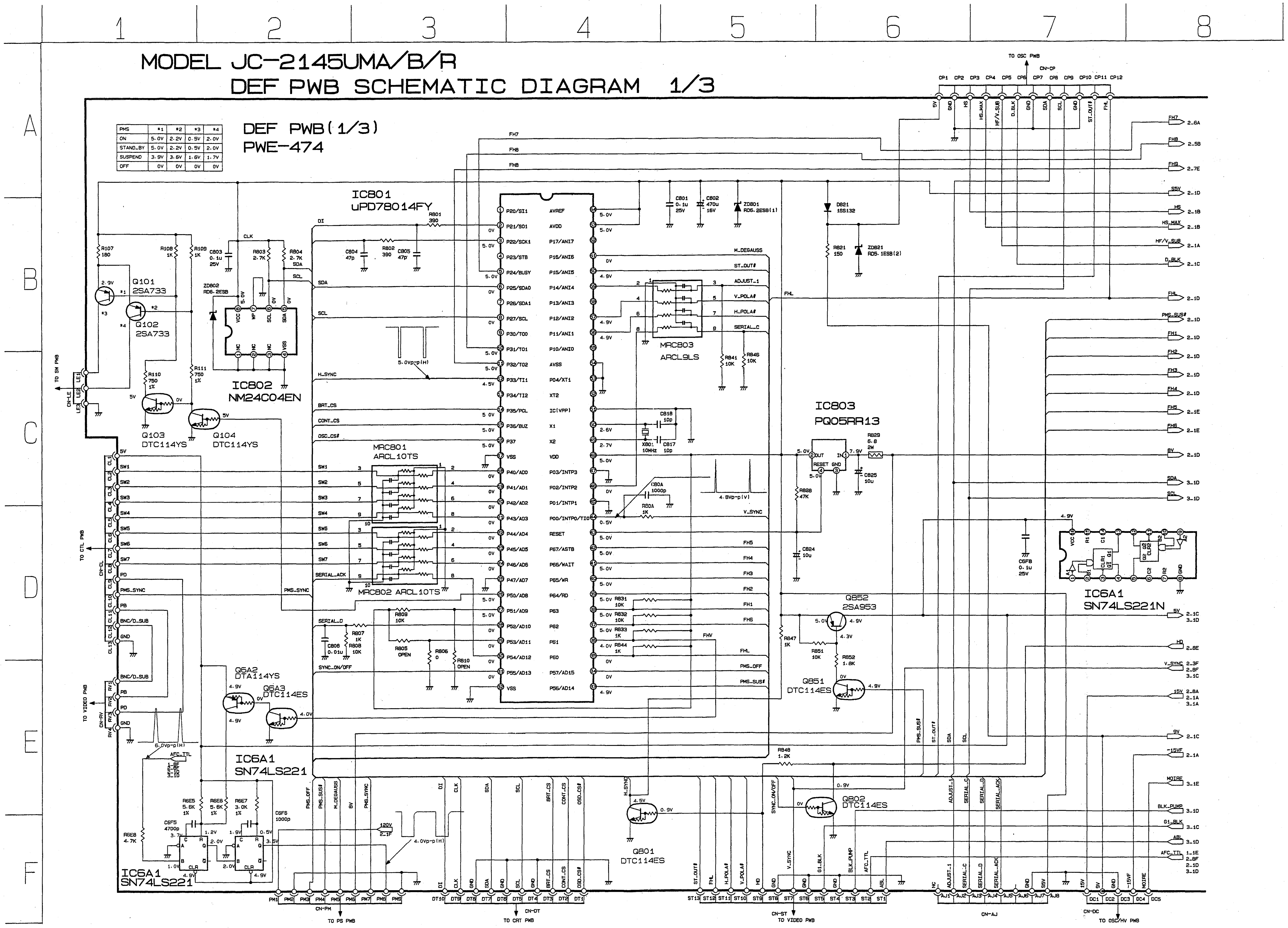
MODEL JC-2145UMA/B/R SW. REG PWB SCHEMATIC DIAGRAM

SW. REG PWB (2/2) PWE-473A


TRIGER
I RESISTER GND
ACSENCE
KEEP VCC
LED
GATE
ISENCE
GND
DRIVE
CN601
11
1
DEGAUSS
OFF
ON
RELAY
8V
80V
GND
CN6A1
7
1
R621 120K 1/10W
R623 10K 1/10W
Q622 DTC114EK
Q624 2SC1623 T2B
ZD625 RD12EB(3)
ZD624 RD39EB(4)
R626 39K 1/10W
R624 10K 1/10W
Q625 2SA812 T2B
Q621 DTC114EK
Q623 2SC1623 T2B
R622 10K 1/10W
ZD623 RD2.0ESB(1)
C622 10u 25V
R628 100 1/10W
D624 1SS132
Q626 2SC1623 T2B
R620 68K 1/10W
D623 1SS132
C621 2.2u 50V
C623 0.01u 50V
C634 10u 50V
R625 15K 1/10W
D625 1SS132
R631 120K 1/10W
R627 10K 1/10W
ZD627 RD22ESB(4)
Q627 2SA812 T2B
R629 10K 1/10W
Q630 2SC1623 T2B
Q628 2SC1623 T2B
C624 0.1u 50V
R630 10K 1/10W
C625 0.01u 50V
ZD629 RD6.2ESB(2)
R632 56K 1/10W
PC601 PC123F
PC602 PC123F
R6G3 3.3K 1/10W
D6F2 1SS290
Q6F3 2SA812 T2B
R6G1 270K 1/10W 1%
D6F1 1SS132
R6G2 1K 1/10W
R6F9 33K 1/10W
R6F8 10K 1/10W
R6G0 1.2M 1/10W 1%
4Vo-p
GND
5V
D626 1SS132
R644 10K 1/10W
R636 1M 1/10W
Q632 2SC1623 T2B
C632 0.015u 50V
R640 6.8K 1/10W 1%
VREF
RT/CT
VFB
COMP
INTERNAL BIAS
5V REF
S/R
UVLO
6V
16V
34V
2.5V
VREF GOOD LOGIC
OSC
ERROR AMP
2R
R
1V
S
R
PWM LATCH
CURRENT SENSE COMPARATOR
VCC
OUTPUT
GROUND
ISENSE
8
7
4
6
2
5
1
3
C633 0.1u 50V
R643 2.2K 1/10W
R642 10K 1/10W
R645 1K 1/10W
D627 1SS132
R641 1.8K 1/10W
C631 4700p 50V
C630 0.015u 50V
C635 0.01u 50V
IC621 UC3842
C637 1u 50V
R646 27 1/10W
D635 1SS132
R647 27 1/10W
R648 120 1/4W
D636 1SS132
C629 3300p 50V
17V
C628 0.1u 50V
C627 220u 25V
R639 33 1/10W
R638 10 1/10W
D629 D1NL20
D628 1SS132
R635 100 1/10W
R633 10K 1/10W
Q633 2SA812 P.Q.R
R649 10K 1/10W
Q631 2SC1623 T2B
R650 33K 1/10W
R637 2.2K 1/10W
C626 0.1u 50V
R634 10K 1/10W
C636 0.1u 50V
PC603 PC123F
R6F1 390 1/10W
R6F2 4.7K 1/10W
C6F1 0.1u 50V
K
R
A
IC6F1 uPC1093J
R6G4 8.2K 1/10W
R6F3 330 1/10W
VR6A1 VR500
R6F5 2.4K 1/10W 1%
Q6F5 DTC144EK
Q6F4 2SC1623 T2B
C6F2 1000p 50v
R6F4 220K 1/10W
R6F6 4.7K 1/10W
R6F7 22K 1/10W
Q6F1 2SC1623 T2B
Q6F2 2SC1623 T2B

MODEL JC-2145UMA/B/R
DEF PWB SCHEMATIC DIAGRAM 1/3

PMS	*1	*2	*3	*4
ON	5.0V	2.2V	0.5V	2.0V
STAND_BY	5.0V	2.2V	0.5V	2.0V
SUSPEND	3.9V	3.6V	1.6V	1.7V
OFF	0V	0V	0V	0V


1
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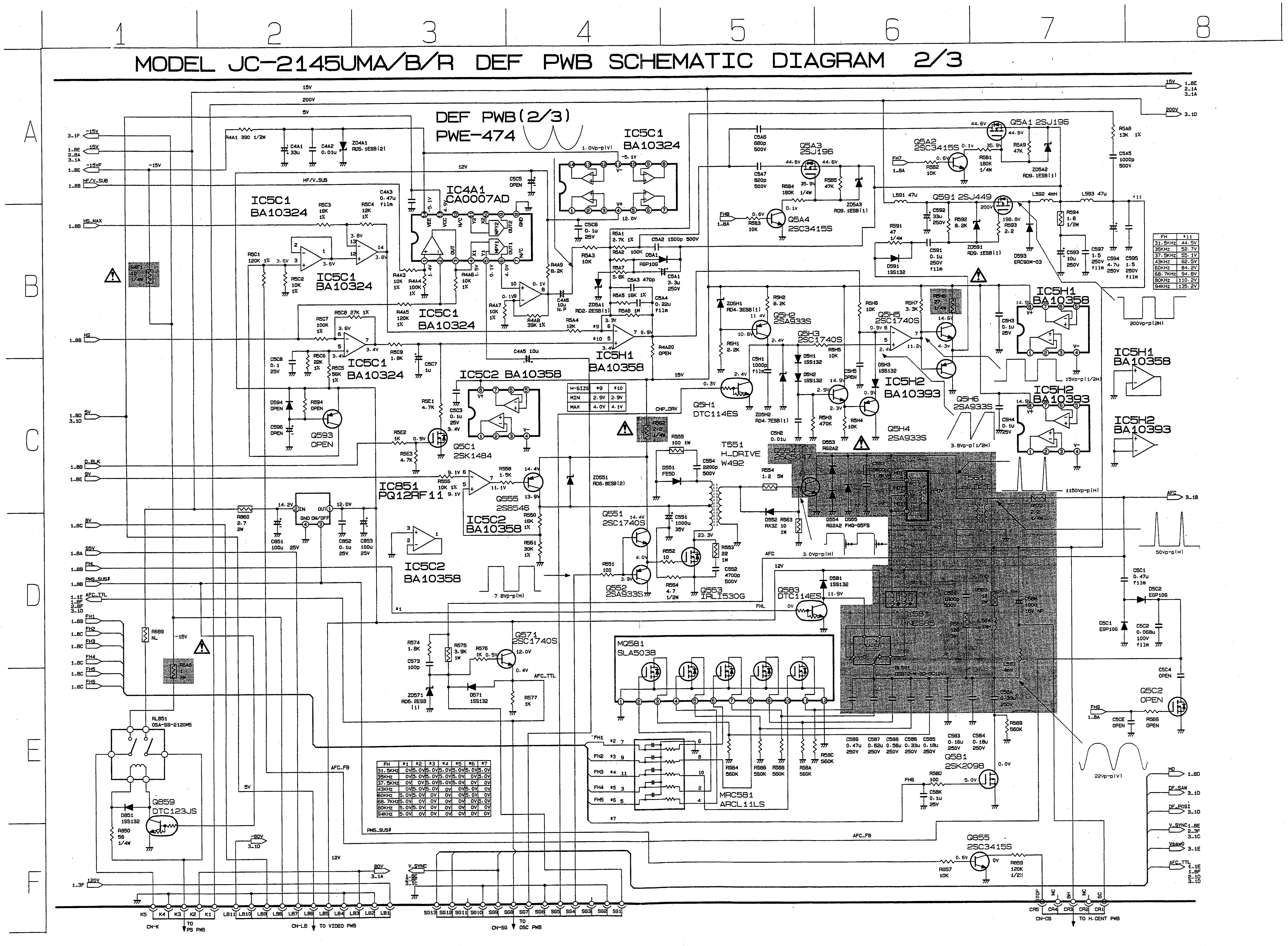
3
4
5
6
7
8
A
B
C
D
E
F
DEF PWB(1/3)
PWE-474
IC801
uPD78014FY
IC802
NM24C04EN
IC803
PQ05RR13
MRC801
ARCL10TS
MRC802 ARCL10TS
MRC803
ARCL9LS
IC6A1
SN74LS221
IC6A1
SN74LS221N
Q101
2SA733
Q102
2SA733
Q103
DTC114YS
Q104
DTC114YS
Q6A2
DTA114YS
Q6A3
DTC114ES
Q801
DTC114ES
Q802
DTC114ES
Q851
DTC114ES
Q852
2SA953
X801
10MHz
ZD801
RD5.2ESB(1)
ZD802
RD5.2ESB
ZD821
RD5.1ESB(2)
D821
1SS132
TO OSC PWB
CN-CP
TO SW PWB
CN-LE
TO CTL PWB
CN-CL
TO VIDEO PWB
CN-RV
TO PS PWB
CN-PM
TO CRT PWB
CN-DT
TO VIDEO PWB
CN-ST
CN-AJ
CN-DC
TO OSC/HV PWB
5.0Vp-p(H)
4.8Vp-p(V)
4.0Vp-p(H)
6.0Vp-p(H)
AFC_TTL
120V
2.1F

MODEL JC-2145UMA/B/R DEF PWB SCHEMATIC DIAGRAM 2/3

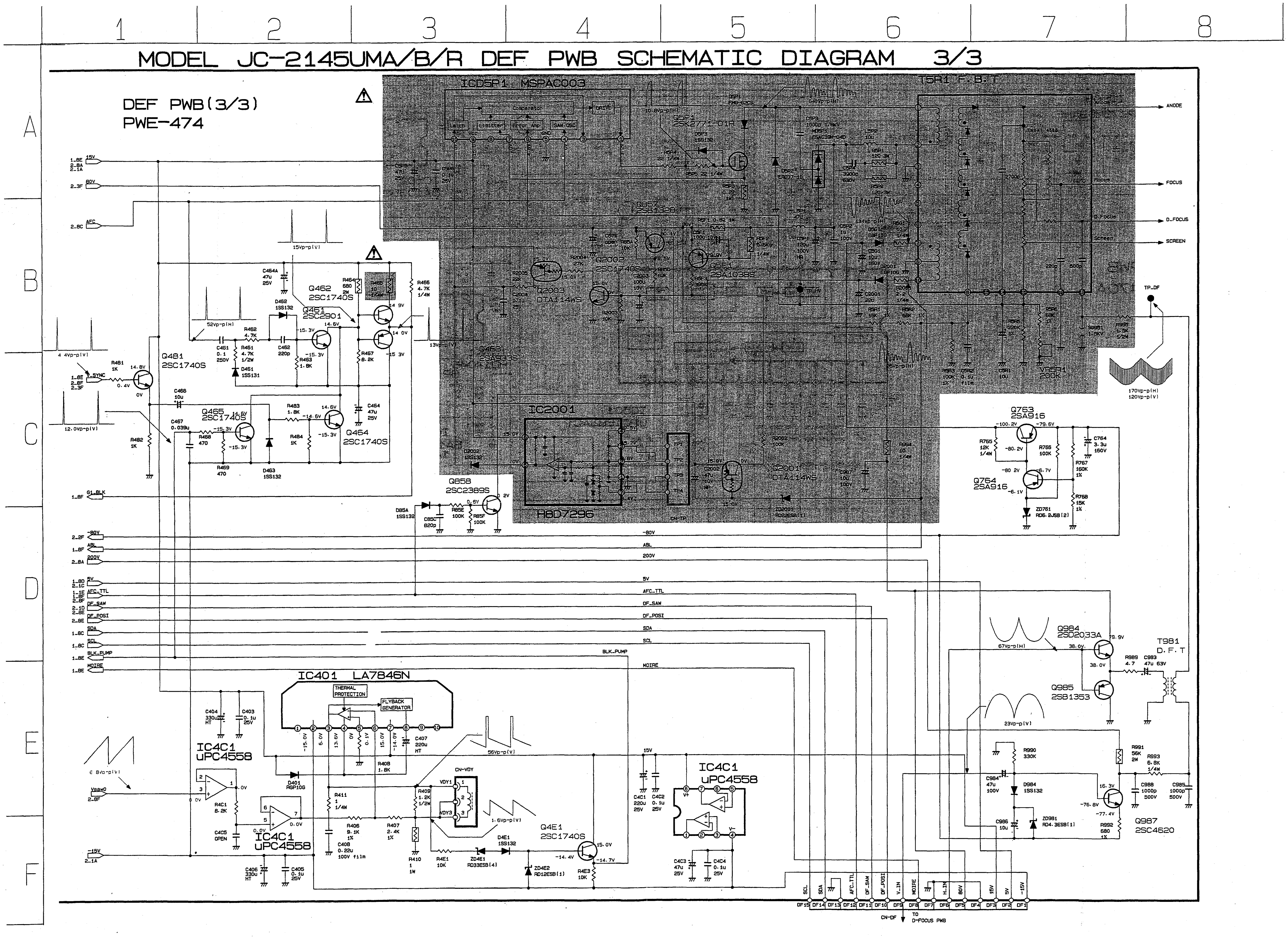

1
2
3
4
5
6
7
8
A
B
C
D
E
F
DEF PWB(2/3)
PWE-474
IC4A1
CA0007AD
IC5C1
BA10324
IC5C2
BA10358
IC5H1
BA10358
IC5H2
BA10393
IC851
PQ12RF11
Q5A1 2SJ196
Q5A2 2SC3415S
Q5A3 2SJ196
Q5A4 2SC3415S
Q591 2SJ449
Q5C1 2SK1484
Q555 2SB546
Q551 2SC1740S
Q552 2SA933S
Q553 IRLI530G
Q5H1 DTC114ES
Q5H2 2SA933S
Q5H3 2SC1740S
Q5H4 2SA933S
Q5H5 2SC1740S
Q5H6 2SA933S
Q583 DTC114ES
Q571 2SC1740S
Q593 OPEN
Q5C2 OPEN
Q581 2SK2098
Q855 2SC3415S
Q859 DTC123JS
T551 H_DRIVE W492
MQ581 SLA5038
MRC581 ARCL11LS
RL851 OSA-SS-2120M5
200Vp-p(2H)
15Vp-p(1/2H)
3.8Vp-p(1/2H)
1150Vp-p(H)
50Vp-p(H)
22Vp-p(V)
7.8Vp-p(H)
3.0Vp-p(H)
1.0Vp-p(V)
15V
200V
5V
12V
AFC
AFC_TTL
AFC_FB
PMS_SUS#
V_SYNC
CN-K
TO PS PWB
CN-LB
TO VIDEO PWB
CN-SG
TO OSC PWB
CN-CS
TO H.CENT PWB

FH	*11
31.5KHz	44.5V
35KHz	52.7V
37.5KHz	55.1V
43KHz	62.5V
60KHz	84.2V
68.7KHz	94.8V
80KHz	110.2V
94KHz	135.2V

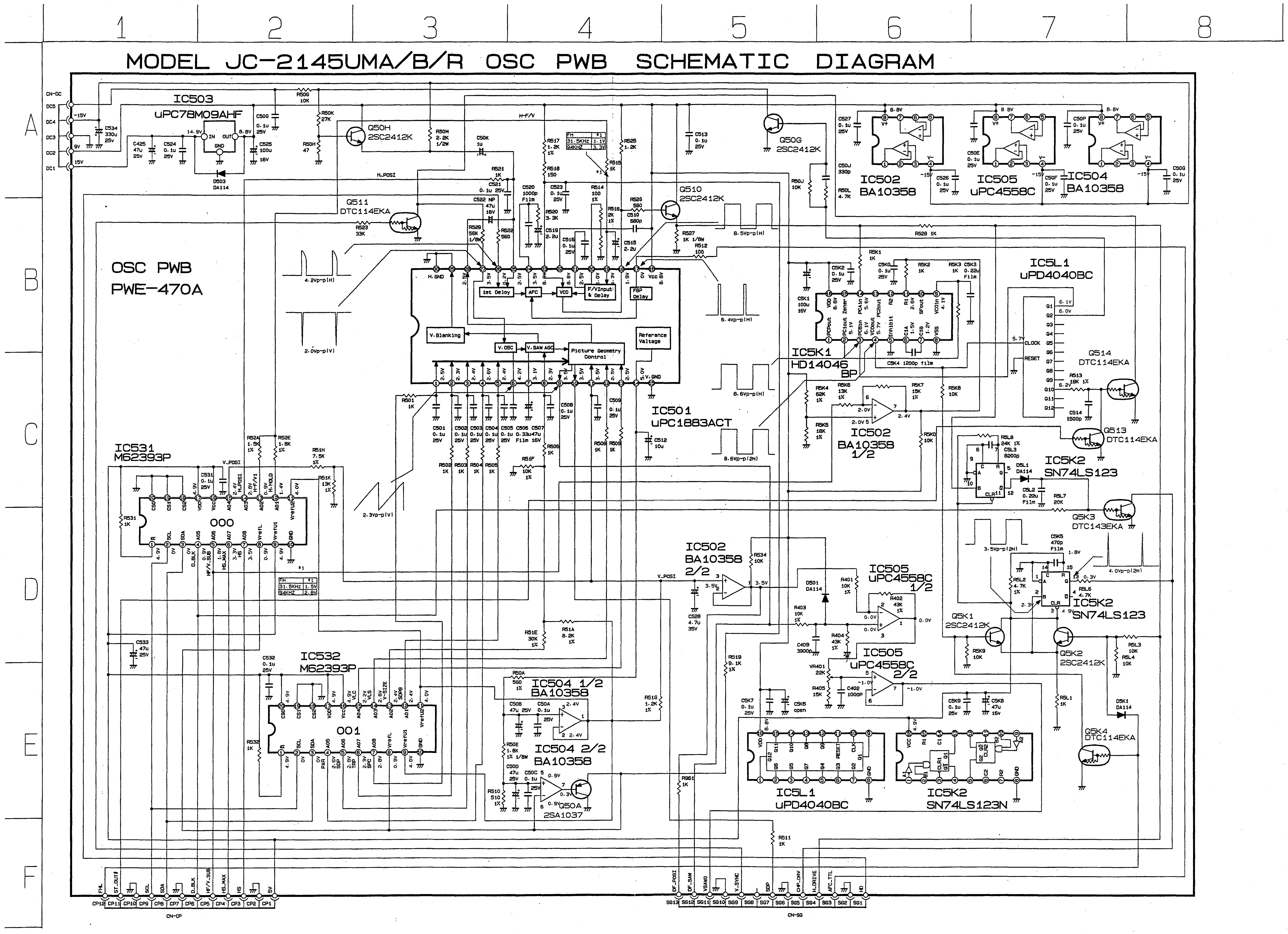
H-SIZE	*9	*10
MIN	2.9V	2.9V
MAX	4.0V	4.1V

FH	*1	*2	*3	*4	*5	*6	*7
31.5KHz	0V	5.0V	5.0V	5.0V	5.0V	5.0V	5.0V
35KHz	0V	5.0V	5.0V	5.0V	5.0V	0V	5.0V
37.5KHz	0V	0V	5.0V	5.0V	5.0V	0V	0V
43KHz	0V	5.0V	5.0V	0V	0V	5.0V	0V
60KHz	5.0V	5.0V	0V	0V	0V	5.0V	0V
68.7KHz	5.0V	0V	0V	0V	0V	0V	5.0V
80KHz	5.0V	5.0V	0V	0V	0V	0V	0V
94KHz	5.0V	0V	0V	0V	0V	0V	0V

MODEL JC-2145UMA/B/R DEF PWB SCHEMATIC DIAGRAM 3/3


1
2
3
4
5
6
7
8
A
B
C
D
E
F
DEF PWB(3/3)
PWE-474
ICD5P1 MSPAC003
T5R1 F.B.T
ANODE
FOCUS
D_FOCUS
SCREEN
TP_DF
Q5P1 2SK2771-01R
Q2002 2SC1740S
Q2003 DTA114WS
2SA1038S
IC2001
R8D7296
Q2001 DTA114WS
Q858 2SC2389S
Q481 2SC1740S
Q462 2SC1740S
Q461 2SC2901
Q463 2SA933S
Q465 2SC1740S
Q464 2SC1740S
Q763 2SA916
Q764 2SA916
Q984 2SD2033A
Q985 2SB1353
T981 D.F.T
Q987 2SC4620
IC401 LA7846N
THERMAL PROTECTION
FLYBACK GENERATOR
IC4C1 uPC4558
CN-VDY
Q4E1 2SC1740S
15V
80V
AFC
V_SYNC
G1_BLK
-80V
ABL
200V
5V
AFC_TTL
DF_SAW
DF_POSI
SDA
SCL
BLK_PUMP
MOIRE
-15V
CN-DF
TO D-FOCUS PWB
15Vp-p(V)
52Vp-p(H)
4.4Vp-p(V)
12.0Vp-p(V)
13Vp-p(V)
170Vp-p(H)
120Vp-p(V)
67Vp-p(H)
23Vp-p(V)
56Vp-p(V)
6.8Vp-p(V)
1.6Vp-p(V)

MODEL JC-2145UMA/B/R OSC PWB SCHEMATIC DIAGRAM


1
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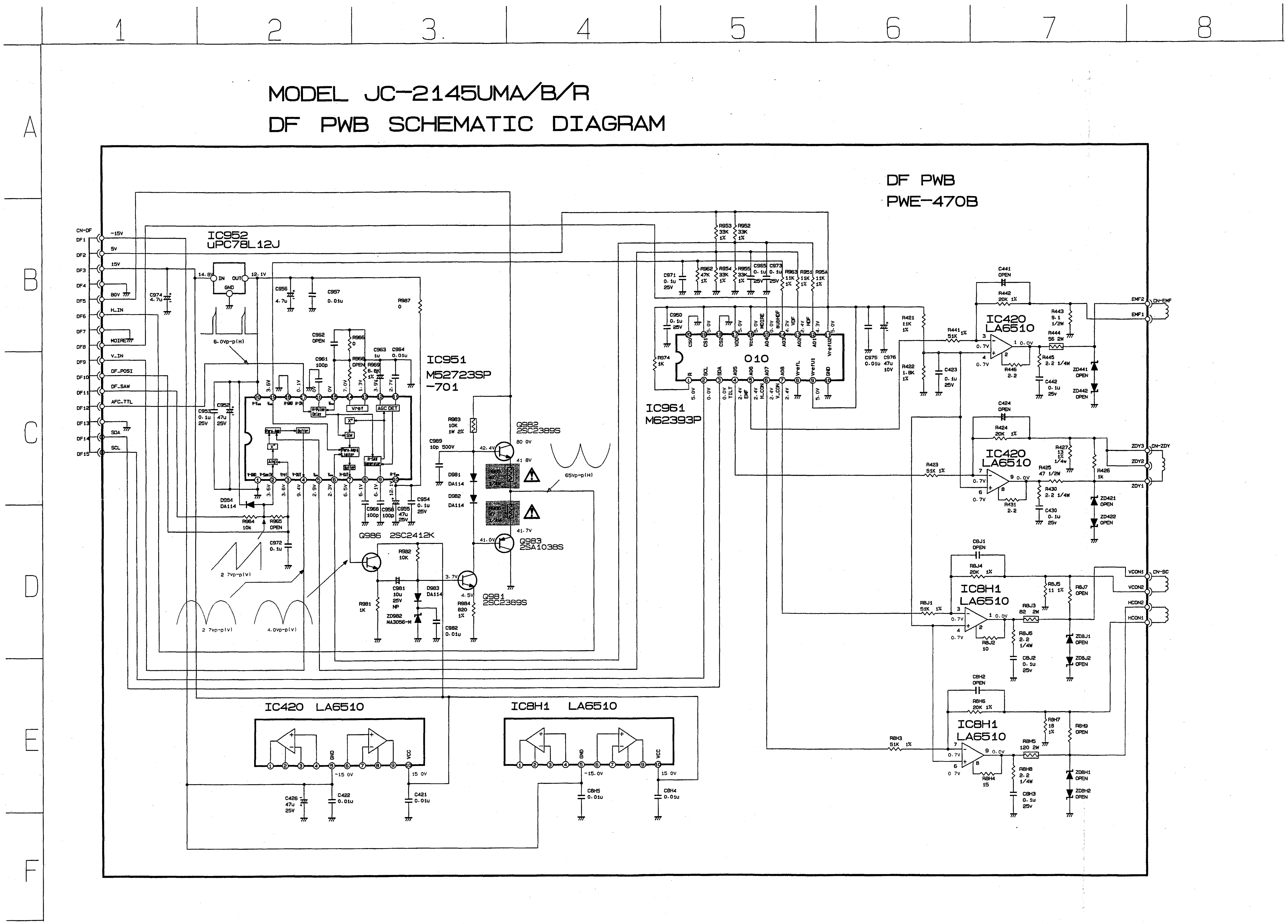
8
A
B
C
D
E
F
OSC PWB
PWE-470A
IC503
uPC78M09AHF
Q50H
2SC2412K
Q50G
2SC2412K
Q511
DTC114EKA
Q510
2SC2412K
IC502
BA10358
IC505
uPC4558C
IC504
BA10358
IC5L1
uPD4040BC
IC5K1
HD14046BP
IC501
uPC1883ACT
IC502
BA10358
1/2
Q514
DTC114EKA
Q513
DTC114EKA
IC5K2
SN74LS123
Q5K3
DTC143EKA
IC531
M62393P
000
IC502
BA10358
2/2
IC505
uPC4558C
1/2
Q5K1
2SC2412K
Q5K2
2SC2412K
IC505
uPC4558C
2/2
IC532
M62393P
001
IC504 1/2
BA10358
IC504 2/2
BA10358
Q50A
2SA1037
Q5K4
DTC114EKA
IC5L1
uPD4040BC
IC5K2
SN74LS123N
1st Delay
AFC
VCO
F/VInput & Delay
FBP Delay
V.Blanking
V.OSC
V.SAW AGC
Picture Geometry Control
Referance Voltage
H-F/V
H.POSI
V_POSI
4.2Vp-p(H)
2.0Vp-p(V)
8.5Vp-p(H)
6.4Vp-p(H)
8.6Vp-p(H)
8.6Vp-p(2H)
2.3Vp-p(V)
3.5Vp-p(2H)
4.0Vp-p(2H)
CN-DC
DC5
DC4
DC3
DC2
DC1
CN-CP
CP12
CP11
CP10
CP9
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP1
FHL
ST_OUT#
SCL
SDA
O_BLK
HF/V.SUB
HS_MAX
HS
5V
CN-SG
SG13
SG12
SG11
SG10
SG9
SG8
SG7
SG6
SG5
SG4
SG3
SG2
SG1
DF_POSI
DF_SAW
VBAND
V_SYNC
SDP
CHP_DRV
H_DRIVE
AFC_TTL
HD

RUN No. 1

MODEL JC-2145UMA/B/R
DF PWB SCHEMATIC DIAGRAM



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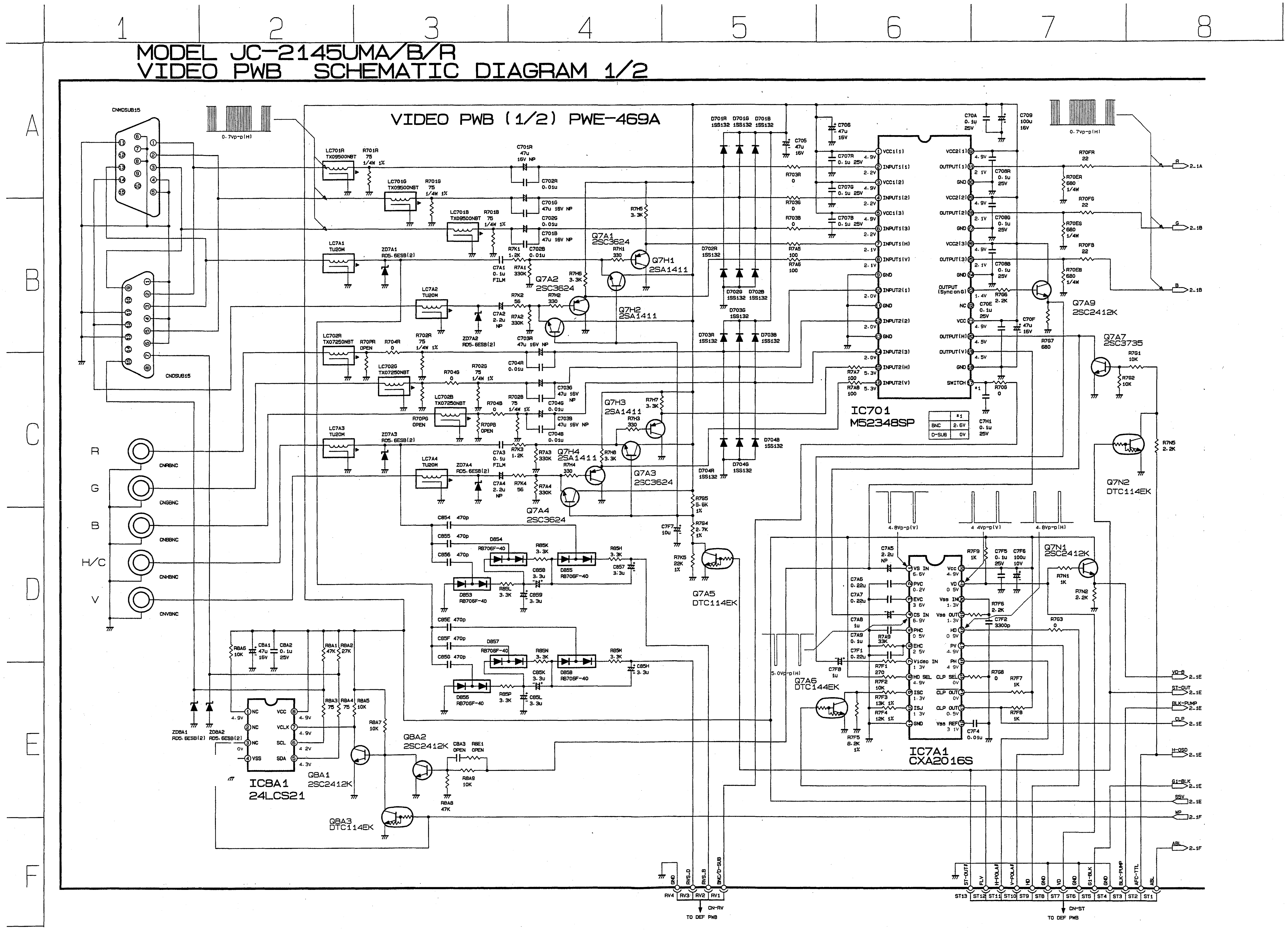
A
B
C
D
E
F
DF PWB
PWE-470B
CN-DF
DF1
DF2
DF3
DF4
DF5
DF6
DF7
DF8
DF9
DF10
DF11
DF12
DF13
DF14
DF15
-15V
5V
15V
80V
H_IN
MOIRE
V_IN
DF_POSI
DF_SAW
AFC_TTL
SDA
SCL
IC952
uPC78L12J
IN
OUT
GND
IC951
M52723SP
-701
IC961
M62393P
Q982
2SC2389S
Q983
2SA1038S
Q981
2SC2389S
Q986 2SC2412K
IC420
LA6510
IC8H1
LA6510
IC420 LA6510
IC8H1 LA6510
6.0Vp-p(H)
65Vp-p(H)
2.7Vp-p(V)
4.0Vp-p(V)
CN-EMF
EMF2
EMF1
CN-ZDY
ZDY3
ZDY2
ZDY1
CN-SC
VCON1
VCON2
HCON2
HCON1

MODEL JC-2145UMA/B/R
VIDEO PWB SCHEMATIC DIAGRAM 1/2


1
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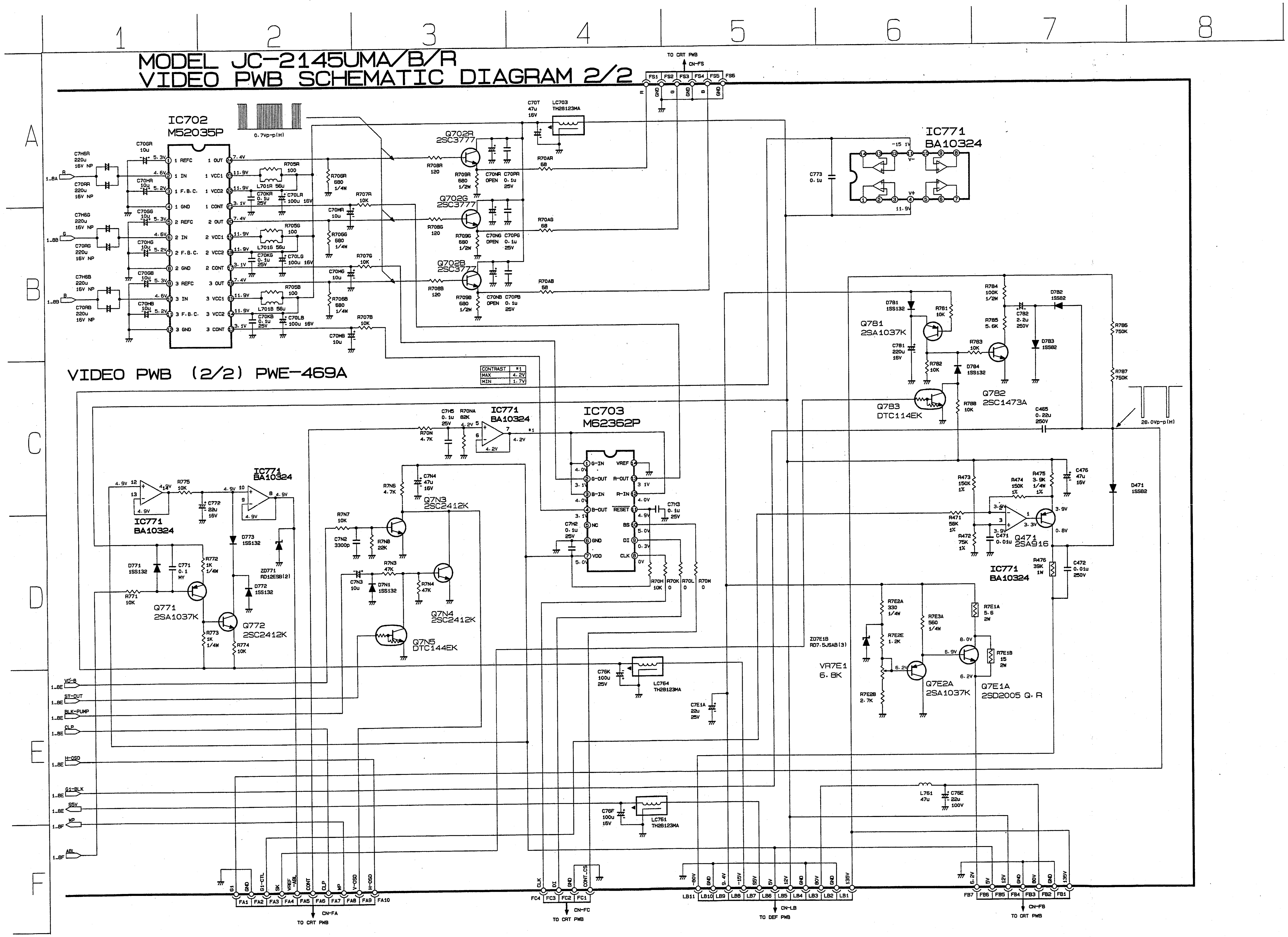
7
8
A
B
C
D
E
F
VIDEO PWB (1/2) PWE-469A
CNMDSUB15
CNDSUB15
0.7Vp-p(H)
R
G
B
H/C
V
CNRBNC
CNGBNC
CNBBNC
CNHBNC
CNVBNC
Q7A1 2SC3624
Q7H1 2SA1411
Q7A2 2SC3624
Q7H2 2SA1411
Q7H3 2SA1411
Q7H4 2SA1411
Q7A3 2SC3624
Q7A4 2SC3624
Q7A5 DTC114EK
IC701 M52348SP
Q7A9 2SC2412K
Q7A7 2SC3735
Q7N2 DTC114EK
Q7N1 2SC2412K
Q7A6 DTC144EK
IC7A1 CXA2016S
IC8A1 24LCS21
Q8A1 2SC2412K
Q8A2 2SC2412K
Q8A3 DTC114EK
4.8Vp-p(V)
4.4Vp-p(V)
4.8Vp-p(H)
5.0Vp-p(H)
BNC 2.6V
D-SUB 0V
2-1A
2-1B
2-1E
2-1F
VD-B
ST-OUT
BLK-PUMP
CLP
H-OSD
G1-BLK
S5V
MP
ABL
RV4
RV3
RV2
RV1
CN-RV
TO DEF PWB
ST13
ST12
ST11
ST10
ST9
ST8
ST7
ST6
ST5
ST4
ST3
ST2
ST1
CN-ST
TO DEF PWB

RUN No. 1

MODEL JC-2145UMA/B/R
VIDEO PWB SCHEMATIC DIAGRAM 2/2


1
2
3
4
5
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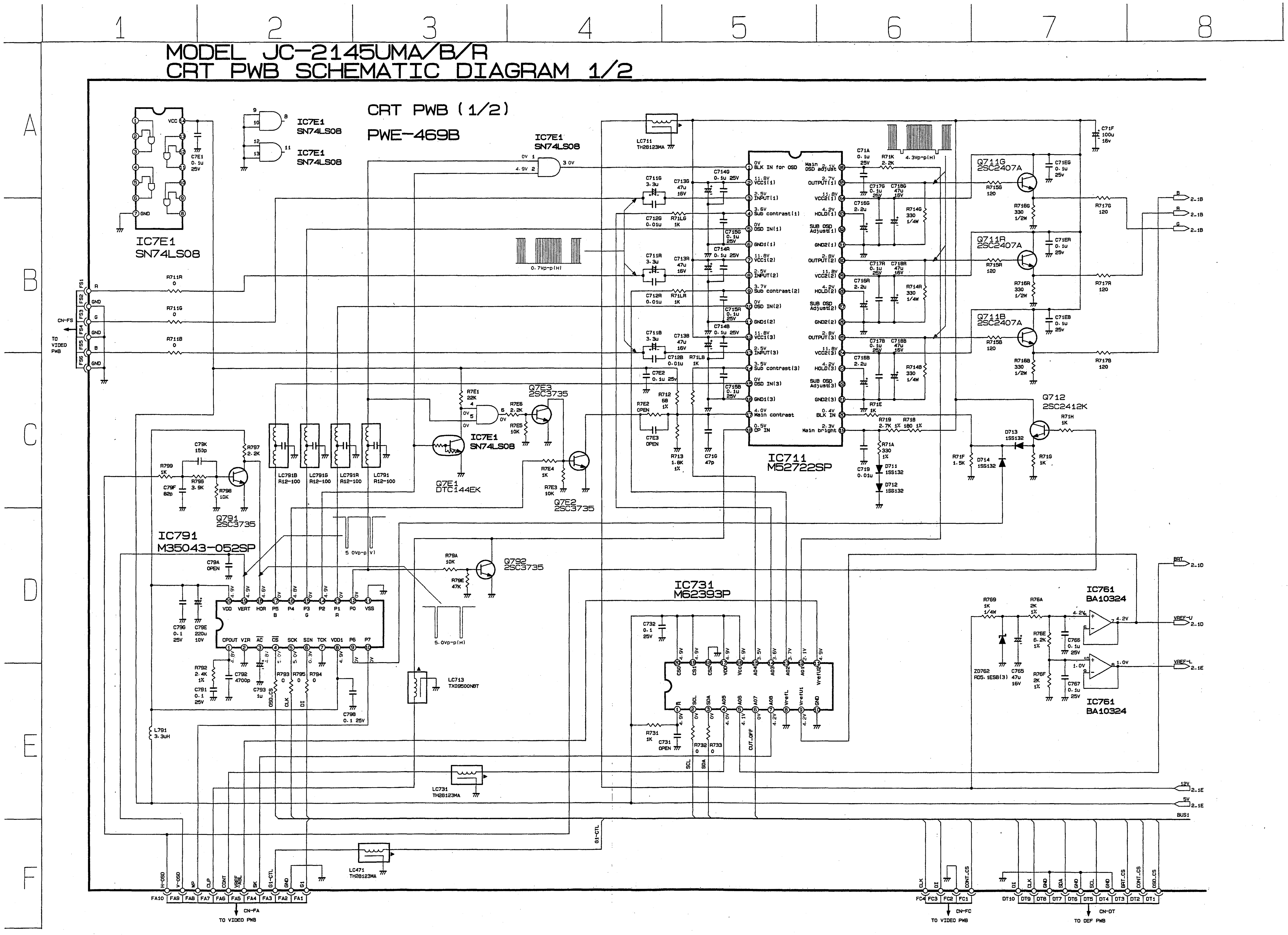
7
8
A
B
C
D
E
F
IC702
M52035P
0.7Vp-p(H)
Q702R
2SC3777
Q702G
2SC3777
Q702B
2SC3777
LC703
TH28123MA
TO CRT PWB
CN-FS
FS1
FS2
FS3
FS4
FS5
FS6
IC771
BA10324
C773
0.1u
VIDEO PWB (2/2) PWE-469A
CONTRAST
MAX 4.2V
MIN 1.7V
IC771
BA10324
IC703
M62362P
Q781
2SA1037K
Q782
2SC1473A
Q783
DTC114EK
28.0Vp-p(H)
D471
1SS82
Q471
2SA916
IC771
BA10324
Q7N3
2SC2412K
Q7N4
2SC2412K
Q7N5
DTC144EK
IC771
BA10324
Q771
2SA1037K
Q772
2SC2412K
D773
1SS132
ZD771
RD12ESB(2)
D772
1SS132
D771
1SS132
ZD7E1B
RD7.5JSAB(3)
VR7E1
6.8K
Q7E2A
2SA1037K
Q7E1A
2SD2005 Q.R
LC764
TH28123MA
LC761
TH28123MA
L761
47u
VD-B
ST-OUT
BLK-PUMP
CLP
H-OSD
G1-BLK
S5V
WP
ABL
FA1
FA2
FA3
FA4
FA5
FA6
FA7
FA8
FA9
FA10
CN-FA
TO CRT PWB
FC4
FC3
FC2
FC1
CN-FC
TO CRT PWB
LB11
LB10
LB9
LB8
LB7
LB6
LB5
LB4
LB3
LB2
LB1
CN-LB
TO DEF PWB
FB7
FB6
FB5
FB4
FB3
FB2
FB1
CN-FB
TO CRT PWB

08119061-E
~08119063-E



MODEL JC-2145UMA/B/R
CRT PWB SCHEMATIC DIAGRAM 1/2

1
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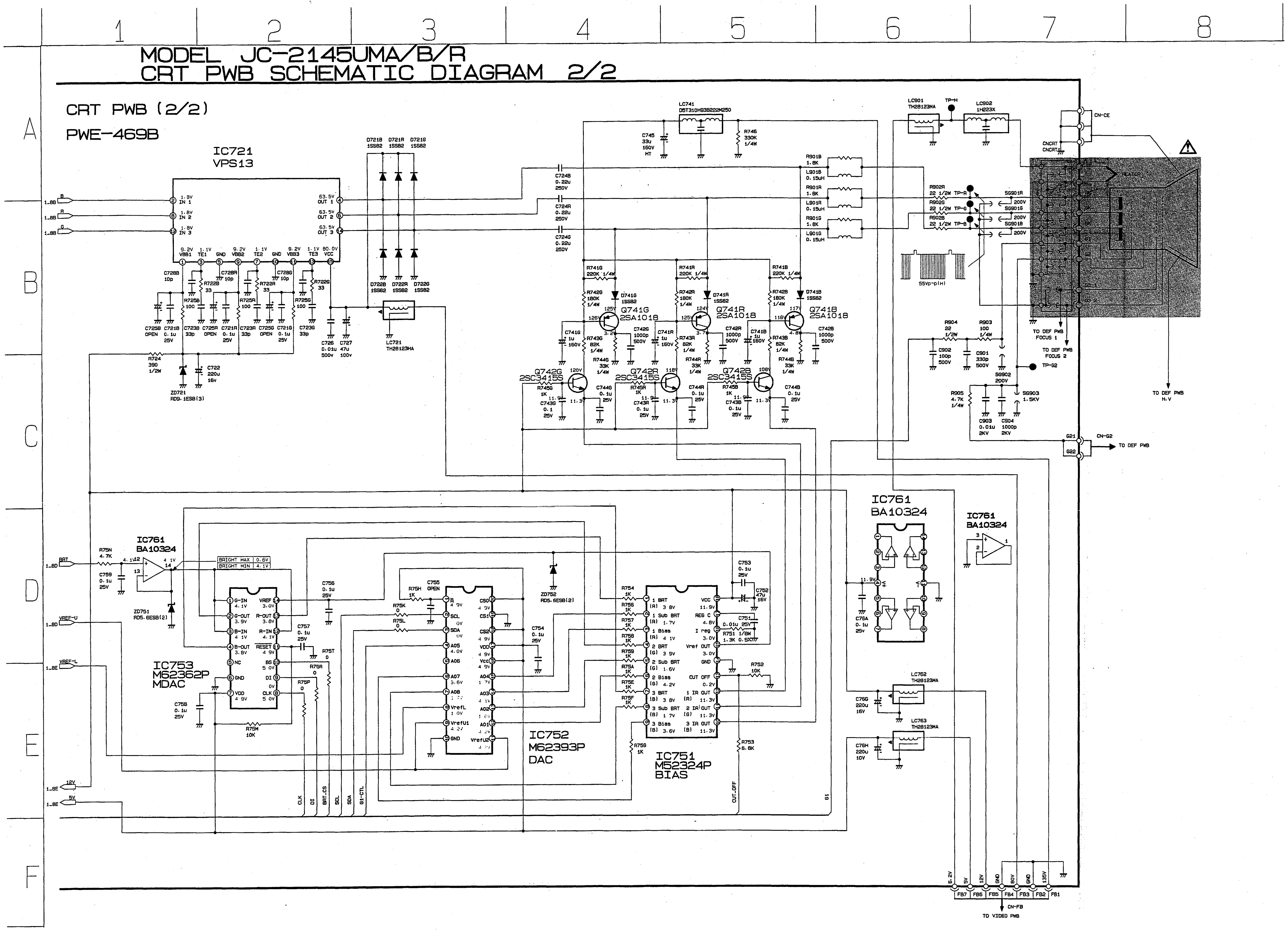
A
B
C
D
E
F
CRT PWB (1/2)
PWE-469B
IC7E1
SN74LS08
IC711
M52722SP
IC791
M35043-052SP
IC731
M62393P
IC761
BA10324
Q711G
2SC2407A
Q711R
2SC2407A
Q711B
2SC2407A
Q712
2SC2412K
Q7E3
2SC3735
Q7E2
2SC3735
Q7E1
DTC144EK
Q791
2SC3735
Q792
2SC3735
LC711
TH28123MA
LC713
TX09500NBT
LC731
TH28123MA
LC471
TH28123MA
0.7Vp-p(H)
4.3Vp-p(H)
5.0Vp-p(V)
5.0Vp-p(H)
CN-FS
TO VIDEO PWB
CN-FA
TO VIDEO PWB
CN-FC
TO VIDEO PWB
CN-DT
TO DEF PWB
BUS1
12V
5V
VREF-U
VREF-L

MODEL JC-2145UMA/B/R
CRT PWB SCHEMATIC DIAGRAM 2/2


1
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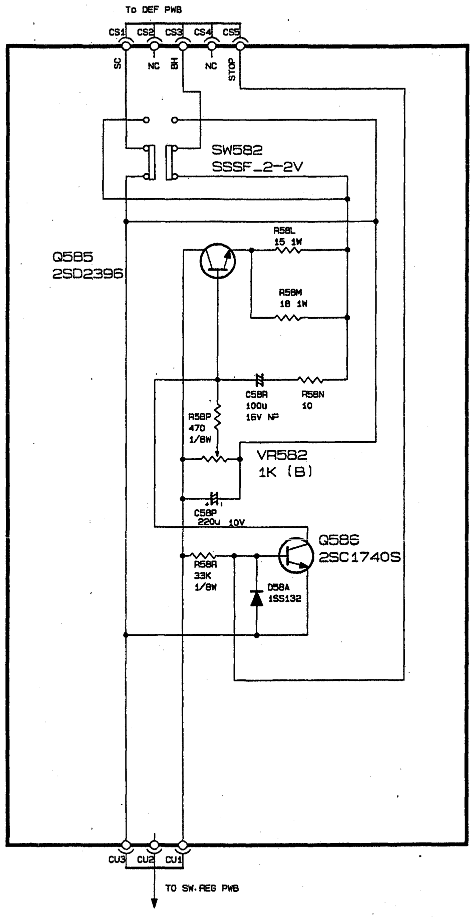
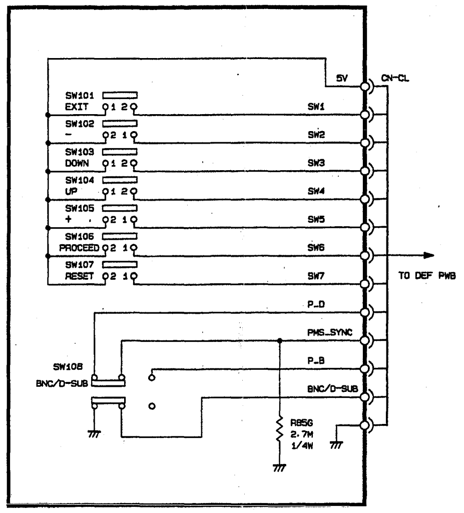
A
B
C
D
E
F
CRT PWB (2/2)
PWE-469B
IC721
VPS13
1.8V IN 1
1.8V IN 2
1.8V IN 3
63.5V OUT 1
63.5V OUT 2
63.5V OUT 3
9.2V VBB1
1.1V TE1
GND
9.2V VBB2
1.1V TE2
GND
9.2V VBB3
1.1V TE3
80.0V VCC
1_8B B
1_8B R
1_8B G
D721B 1SS82
D721R 1SS82
D721G 1SS82
D722B 1SS82
D722R 1SS82
D722G 1SS82
C728B 10p
C728R 10p
C728G 10p
R722B 33
R722R 33
R722G 33
R725B 100
R725R 100
R725G 100
C725B OPEN
C721B 0.1u 25V
C723B 33p
C725R OPEN
C721R 0.1u 25V
C723R 33p
C725G OPEN
C721G 0.1u 25V
C723G 33p
C726 0.01u 500v
C727 47u 100v
LC721 TH28123HA
R724 390 1/2W
C722 220u 16v
ZD721 RD9.1ESB(3)
C724B 0.22u 250V
C724R 0.22u 250V
C724G 0.22u 250V
LC741 D5T310H93B222M250
C745 33u 160V HT
R746 330K 1/4W
R901B 1.8K
L901B 0.15uH
R901R 1.8K
L901R 0.15uH
R901G 1.8K
L901G 0.15uH
R741G 220K 1/4W
R741R 220K 1/4W
R741B 220K 1/4W
R742G 180K 1/4W
R742R 180K 1/4W
R742B 180K 1/4W
D741G 1SS82
D741R 1SS82
D741B 1SS82
Q741G 2SA1018
Q741R 2SA1018
Q741B 2SA1018
125V
126V
3.2V
124V
125V
3.7V
117V
118V
4.8V
C741G 1u 160V
C741R 1u 160V
C741B 1u 160V
R743G 82K 1/4W
R743R 82K 1/4W
R743B 82K 1/4W
C742G 1000p 500V
C742R 1000p 500V
C742B 1000p 500V
R744G 33K 1/4W
R744R 33K 1/4W
R744B 33K 1/4W
Q742G 2SC3415S
Q742R 2SC3415S
Q742B 2SC3415S
120V
118V
108V
R745G 1K
R745R 1K
R745B 1K
11.9V
11.3V
C743G 0.1 25V
C743R 0.1u 25V
C743B 0.1u 25V
C744G 0.1u 25V
C744R 0.1u 25V
C744B 0.1u 25V
LC901 TH28123MA
TP-H
LC902 1H223X
CN-CE
CNCRT
CNCRT1
R902R 22 1/2W TP-R
R902G 22 1/2W TP-G
R902B 22 1/2W TP-B
SG901R 200V
SG901G 200V
SG901B 200V
55Vp-p(H)
HEATER
G1
G2
G3-1
G3-2
R904 22 1/2W
R903 100 1/4W
C902 100p 500V
C901 330p 500V
SG902 200V
TP-G2
R905 4.7K 1/4W
SG903 1.5KV
C903 0.01u 2KV
C904 1000p 2KV
TO DEF PWB FOCUS 1
TO DEF PWB FOCUS 2
TO DEF PWB H.V
G21
G22
CN-G2
TO DEF PWB
IC761
BA10324
1_8D BRT
R75N 4.7K
C759 0.1u 25V
4.1V
12
13
4.1V
14
BRIGHT MAX 0.6V
BRIGHT MIN 4.1V
ZD751 RD5.6ESB(2)
1_8D VREF-U
1_8E VREF-L
1_8E 12V
1_8E 5V
IC753
M62362P
MDAC
G-IN 4.1V
G-OUT 3.9V
B-IN 4.1V
B-OUT 3.8V
NC
GND
VDD 4.9V
VREF 3.0V
R-OUT 3.8V
R-IN 4.1V
RESET 4.9V
BS 5.0V
DI 0V
CLK 5.0V
C756 0.1u 25V
C757 0.1u 25V
R75T 0
R75R 0
R75P 0
C758 0.1u 25V
R75M 10K
CLK
DI
BRT_CS
SCL
SDA
G1-CTL
R75H 1K
C755 OPEN
R75K 0
R75L 0
IC752
M62393P
DAC
R 4.9V
SCL 0V
SDA 0V
A05 4.0V
A06
A07 3.6V
A08
VrefL 1.0V
VrefU1 4.2V
GND
CS0 4.9V
CS1
CS2 4.9V
VDD 4.9V
Vcc 4.9V
A04 1.7V
A03 4.1V
A02
A01 4.2V
VrefU2
ZD752 RD5.6ESB(2)
C754 0.1u 25V
IC751
M52324P
BIAS
R754 1K
R756 1K
R757 1K
R758 1K
R759 1K
R75A 1K
R75E 1K
R75F 1K
1 BRT (R) 3.8V
1 Sub BRT (R) 1.7V
1 Bias (R) 4.1V
2 BRT (G) 3.9V
2 Sub BRT (G) 1.6V
2 Bias (G) 4.2V
3 BRT (B) 3.8V
3 Sub BRT (B) 1.7V
3 Bias (B) 3.6V
VCC 11.9V
REG C 4.8V
I reg 3.0V
Vref OUT 3.0V
GND
CUT OFF 0.2V
1 IR OUT (R) 11.3V
2 IR OUT (G) 11.3V
3 IR OUT (B) 11.3V
C753 0.1u 25V
C752 47u 16V
C751 0.01u 25V
R751 1/8W 1.3K 0.5%
R752 10K
R753 6.8K
R75G 1K
CUT_OFF
G1
11.9V
C76A 0.1u 25v
LC762 TH28123MA
C76G 220u 16V
LC763 TH28123MA
C76H 220u 10V
5.2V
5V
12V
GND
80V
GND
135V
FB7
FB6
FB5
FB4
FB3
FB2
FB1
CN-FB
TO VIDEO PWB

JC-2145UMA/B/R SCHEMATIC DIAGRAM

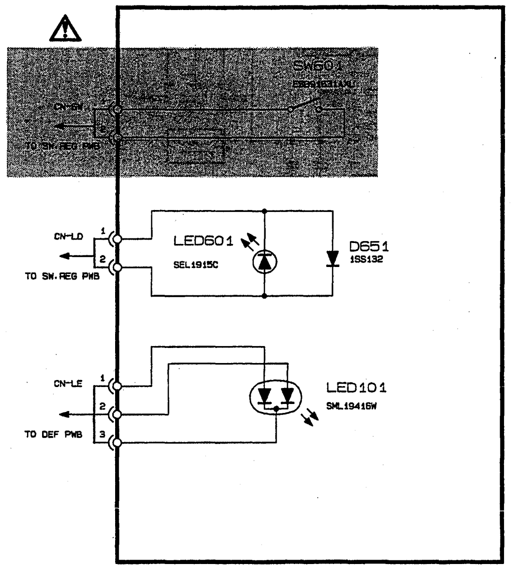
PWE-469F
HCENT PWB


To DEF PWB
CS1 CS2 CS3 CS4 CS5
SC
NC
BH
NC
STOP
SW582
SSSF_2-2V
Q585
2SD2396
R58L
15 1W
R58M
18 1W
C58R
100u
16V NP
R58N
10
R58P
470
1/8W
VR582
1K (B)
C58P
220u 10V
Q586
2SC1740S
R58R
33K
1/8W
D58A
1SS132
CU3 CU2 CU1
TO SW.REG PWB

PWE-479B
CONTROL PWB


5V
CN-CL
SW101
EXIT
SW102
-
SW103
DOWN
SW104
UP
SW105
+
SW106
PROCEED
SW107
RESET
SW1
SW2
SW3
SW4
SW5
SW6
SW7
P_D
PMS_SYNC
P_B
BNC/D-SUB
SW108
BNC/D-SUB
R85G
2.7M
1/4W
TO DEF PWB

PWE-479C
SW PWB


⚠
SW601
CN-SW
TO SW.REG PWB
CN-LD
TO SW.REG PWB
LED601
SEL1915C
D651
1SS132
CN-LE
TO DEF PWB
LED101
SML19416W

NOTES

1. RESISTOR VALUES ARE IN Ω (OHM). K=1,000Ω M=1,000,000Ω
2. RESISTORS OF PWE-469* AND PWE-470* ARE 1/10W AND RESISTORS OF PWE-474 ARE 1/6W EXCEPT WHERE OTHERWISE INDECATED.
3. CAPACITOR VALUES ARE IN uF UNLESS OTHERWISE INDECATED. P=PF
4. ALL CAPACITORS ARE 50VOLTS EXCEPT WHERE OTHERWISE INDECATED.
5. VOLTAGES AND WAVEFORMS ARE MEASURED UNDER THE ALL WHITE SIGNALS IN THE CONDITIONS OF THE CONTRAST CONTROL IS MAXIMUM. THE BRIGHTNESS CONTROL IS MINIMUM AND ALL OTHER CONTROLS ARE NORMAL OPERATION.
6. (H) : HORIZONTAL RATE (V) : VERTICAL RATE
7. VOLTAGES AND WAVEFORMS ARE MEASURED UNDER THE FOLLOWING SYNC AND VIDEO EXCEPT WHERE OTHERWISE INDICATED.

SYNC : HORIZONTAL RATE 31.5KHz TTL LEVEL NEGATIVE.
VERTICAL RATE 60Hz TTL LEVEL NEGATIVE.
VIDEO : ANALOG 0.7Vp-p POSITIVE

WARNING

REPLACEMENT PARTS WHICH HAVE SPECIAL SAFETY CHARACTERISTICS ARE IDENTIFIED BY ⚠ SHADING ON THE SCHMATICS.
REPLACE THESE CRITICAL COMPONENTS WITH RECOMMENDED REPLACEMENT PARTS.
DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.
CONTROLS MARKED * IS PERMANENTLY FROZEN.
DO NOT ATTEMPT TO DEFEAT OR IMPROPERLY REPLACE